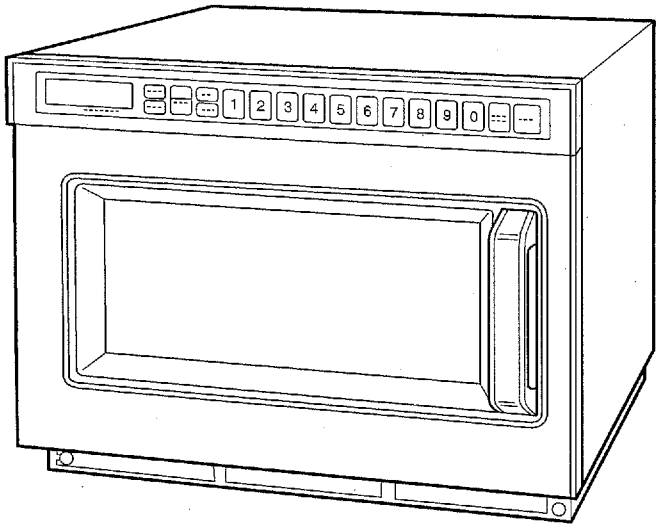
ORDER NO. MOD9610115C3

Service Manual

Microwave Oven

NE-1356
NE-1456
NE-1756
NE-1856



Specifications

		NE-1356	NE-1456	NE-1756	NE-1856
Power Source :		220-240 V AC Single Phase, 50Hz			
Power Requirement :		2230 W	2270 W	2780 W	2830 W
High frequency Output :	HIGH	1300 W (IEC-705)	1400 W (IEC-705)	1700 W (IEC-705)	1800 W (IEC-705)
	MED	650 W	700 W	850 W	900 W
	DEF	340 W	340 W	340 W	340 W
Frequency :		2450 MHz			
Timer :		15 Min. ····· HIGH, MED 30 Min. ····· DEF			
Outside Dimensions :		422 mm (W) X 508 mm (D) X 337 mm (H)			
Oven Cavity Dimensions :		330 mm (W) X 310 mm (D) X 175 mm (H)			
Weight :		30 kg			
Specification subject to change without notice.					

National/Panasonic

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MC-Service

⚠ WARNING

This service information is designed for experienced repair technicians only and is not designed for use by the general public. It does not contain warnings or cautions to advise non-technical individuals of potential dangers in attempting to service a product.
Products powered by electricity should be serviced or repaired only by experienced professional technicians. Any attempt to service or repair the product or products dealt with in this service information by anyone else could result in serious injury or death.

WARNING

* This product should be serviced only by trained, qualified personnel.
This service manual covers products for following markets.
When troubleshooting or replacing parts, please refer to the country identifications shown below for your applicable product specification.

QPQ .....For Australia
VPE .....For South Africa
MKQ .....For Singapore
JPG .....For New Zealand
HNE .....For Hong Kong
MNQ .....For Malaysia

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PRODUCT DISTINATION

MODEL	QPQ	JPG	VPE	HNE	MKQ	MNQ
NE-1856	○	○	—	—	○	○
NE-1756	—	—	○	○	—	—
NE-1456	○	○	—	—	○	○
NE-1356	—	—	○	○	—	—

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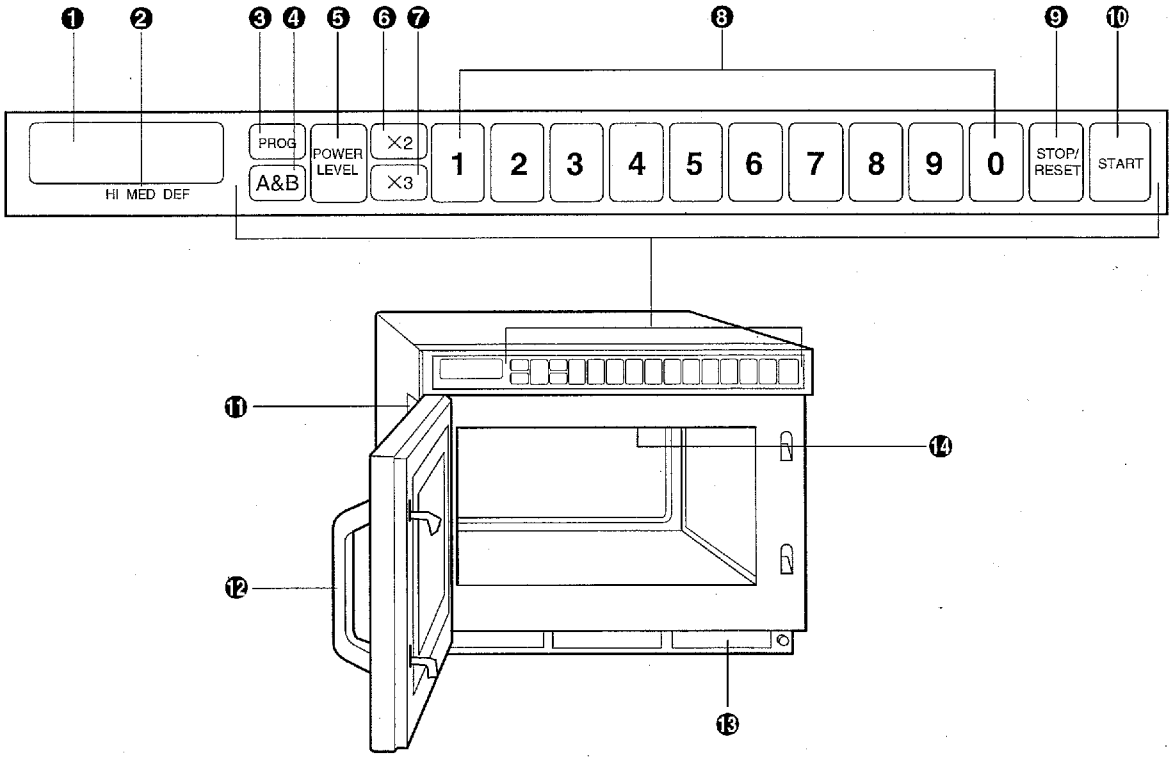
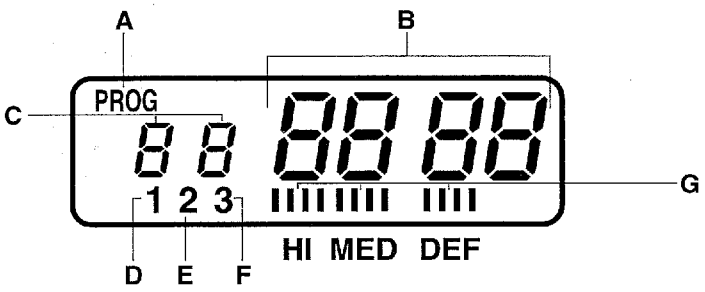
NE-1756	—	—	○	○	—	—
NE-1456	○	○	—	—	○	○
NE-1356	—	—	○	○	—	—

OUTLINE DIAGRAM



❶ Digital Display Window(see below)
❷ Power Level Indicator Display
❸ Program Pad
❹ Shift Pad
❺ Power Level Selector Buttons
❻ Double Quantity Pad
❼ Treble Quantity Pad
❽ Number/Memory Pads
❾ Stop/Reset Pad
❿ Start Pad
⓫ Oven Lamp Cover
⓬ Door Handle
⓭ Air Filter
⓮ Splatter Shield(top of inner cavity)



A—Program Display
B—Heating Time Display(min.sec.)
C—Memory Pad Number Display
D—1st Stage Heating Indicator
E—2nd Stage Heating Indicator
F—3rd Stage Heating Indicator
G—Power Level Indicator

OPERATION PROCEDURE

1. Manual heating for single stage

OPERATION	DISPLAY
1. Plug the power supply cord into wall receptacle.	
2. Open the door. Place a water load in the oven and close the door.	0
3. Tap [POWER LEVEL] pad once. (Set to High power)	1 HI
4. Set the desired heating time by tapping number pads [2], [0], [0]. (Set to 2 minutes)	1 2 00 HI
5. Tap [START] pad.	1 1 59 HI
6. When the time is up, you hear 3 beeps sound.	0
7. Open the door and take out the water load. The display goes back to previously setting time.	1 2 00 HI
8. Close the door. 1 minute later, the display will return blank.	

2. Manual heating for 2nd or 3rd stage

OPERATION	DISPLAY
1. Follow step 1 to 4 for single stage.	1 2 06 HI
2. Tap [POWER LEVEL] pad twice. (Set to MED power)	1 2 MED
3. Set the desired heating time by tapping number pads [1], [0], [0]. (Set to 1 minute)	1 2 1 00 MED
4. Tap [START] pad. (1st stage)	1 2 2 59 HI MED
5. When the 1st stage time is up, you hear 1 beep sound. (2nd stage)	2 59 MED
6. When the time is up, you hear 3 beeps sound.	0
7. Open the door and take out the water load. The display goes back to previously setting time.	1 2 3 00 HI MED
8. Close the door. 1 minute later, the display will return blank.	

NOTE: For a 3rd stage heating cycle, select a further power level and time between steps 3 and 4 above.

3. Memory setting for single stage

OPERATION	DISPLAY
1. Display must be blank before programming can begin. Touch [PROG] pad.	PROG
2. Tap [5] pad. (Set to memory pad 5) NOE: Previously selected power and time will appear.	PROG A 5 1 00 1 HI
3. Tap [POWER LEVEL] pad once. (Set to High power)	PROG A 5 1 HI
4. Set the desired heating time by tapping number pads [1],[0],[0]. (Set to 1 minute)	PROG A 5 1 00 1 HI
5. Touch [PROG] pad again.	PROG A 5 1 00 1 HI
6. 3 seconds after, the display window will go blank.	

TO PROGRAM MEMORY AREA B: Follow steps 1 above. Touch the Memory Shift pad [A►B] and a small "B" will appear beneath the flashing "PROG".
Touch the memory pad you wish to program, and the previously selected time and power level will appear in the display window.

NOTE: Once the Memory area B has been selected it cannot be changed back to Memory area A. If you do not require Memory area B, cancel it by touching the cancel pad and begin again.

4. Memory setting for 2nd or 3rd stage

OPERATION	DISPLAY
1. Follow steps 1 to 4 for memory setting for single stage.	PROG A 5 1 00 1 HI
2. Tap [POWER LEVEL] pad twice. (Set to MED power)	PROG A 5 1 2 MED
3. Set the desired heating time by tapping number pads [2],[0],[0]. (Set to 2 minutes)	PROG A 5 1 2 00 MED
4. Touch Program pad again. Heating time is displayed by adding single and 2nd stage heating time.	PROG A 5 1 2 3 00 HI MED
5. 3 seconds after, the display window will become blank.	

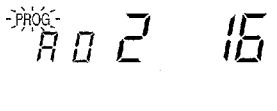
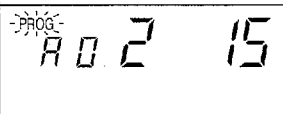
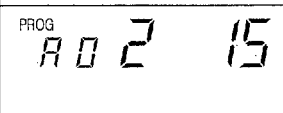
NOTE: For a 3rd stage heating cycle, select a further power level and dial in a time, between steps 3 and 4 above.

5. Memory pad heating

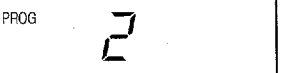
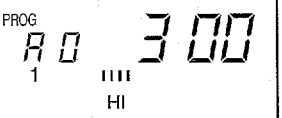
OPERATION	DISPLAY
1. Plug the power supply cord into wall receptacle.	
2. Open the door. Place a water load in the oven and close the door.	0
3. Tap [5] pad.	PROG A 5 1 2 3 00 HI MED
4. Tap [START] pad. (1st stage)	PROG A 5 1 2 2 59 HI MED
5. (2nd stage)	PROG A 5 2 1 59 MED
6. When the time is up, you hear 3 beeps sounds.	0
7. Open the door and take out the water load.	0
8. Close the door. The display will return blank after 1 minute.	

NOTE: When program is locked, heating can be started automatically by tapping memory pad.

6. Programming Double or Treble Quantity Pad

OPERATION	DISPLAY
1. The display window must be blank before programming can begin.	
2. Press the PROG pad.	
3. Press 0 pad. The pad number and previously selected time and power will appear.	
4. Press X2 pad. The previously programmed magnification number appear. ex. 15 means 1.6 times. ※**NOTE: When you want program for treble quantity heating, press X3 pad.**	
5. Set the desired magnification by pressing the appropriate number pad. ex. 1.5 times: press 1 and 5	
6. Press the PROG pad again.	
7. After 3 seconds the display will goes blank.	

7. Memory Pad Heating for Double or Treble Quantity Heating

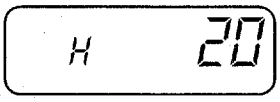
OPERATION	DISPLAY
1. Open the door and place a water load in the oven and close the door.	
2. Press the X2 pad. **NOTE: When you want treble quantity heating, press X3 pad.**	
3. Press the desired memory pad. ex. memory 0 (programme No. A-0)	
4. Press START pad.	
5. When the time is up, you will hear 3 beeps sound.	
6. Open the door and remove the water load.	
7. Close the door 1 minute later, the display will return blank.	

8. Procedure to Program the Air Filter

OPERATION	DISPLAY
1. Open the door and leave it open.	0
2. While pressing START pad, close and open the door.	0
3. Quickly press 3 pad. The display will show the length of time originally PRESET. ex: 100 hours	H 100
4. Set the desired clean time by pressing appropriate pads. ex: 1230 hours, press 1,2,3,0 pads.	H 12 30
5. Press PROG pad.	H 12 30
6. After 3 seconds, "0" will appear.	0
7. After the programmed time past, at the end of cooking, "FILT" will appear.	FILT

Note: To check the total number of hours used.
1. Open the door and leave it open.
2. Whilst pressing the START press the "3" pad.
3. The display will show the number of hours used.

[Example]: If the oven has been used for 20 hours.



After 3 seconds "0" will appear in the display window.

9. To Read the Cycle Counter

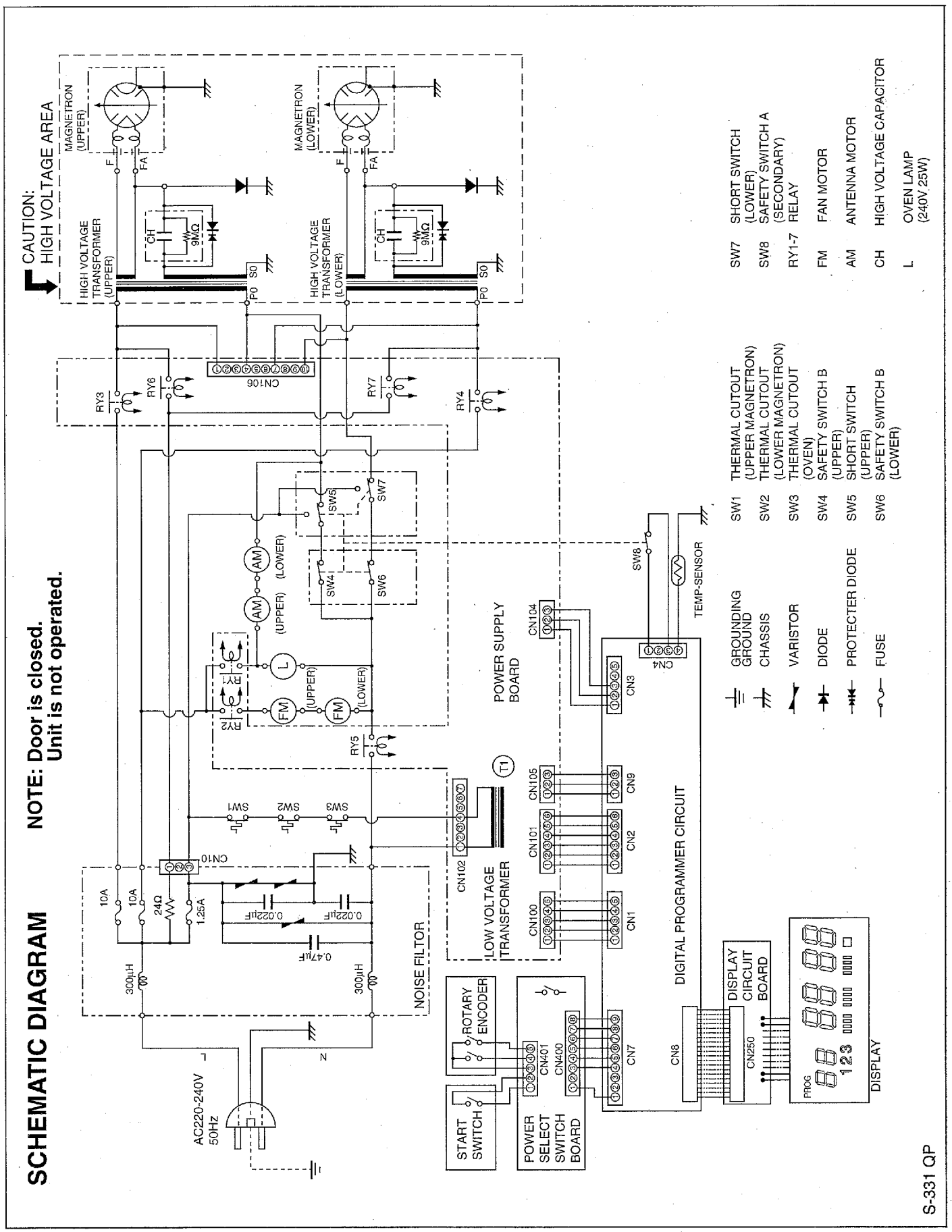
OPERATION	DISPLAY
1. Open the door and leave it open.	0
2. While pressing STOP/RESET pad, press each memory pad. The display shows the number of times each memory pad has been used and pressing the POWER LEVEL pad to show the number of times the oven has been used in the manual mode. ex: 6666→6,666 times **NOTE: To read the number of times the oven has been used in the B side programmes. Remove your finger from STOP/RESET pad and quickly press the A-B shift pad.**	6666
3. Remove your finger from STOP/RESET pad and quickly close door while the display is still showing a pad's cycle count. Display will now show the total cumulative number of times the oven has been used. ex: 99999→99,999 times.	9 9999
4. 3 seconds later, the display will go blank.	

NOTE: Total cumulative number includes programming memory heating and manual heating number of times has been used. Cooking times over 99,999 times will be back 0.

10. To Activate Program Lock

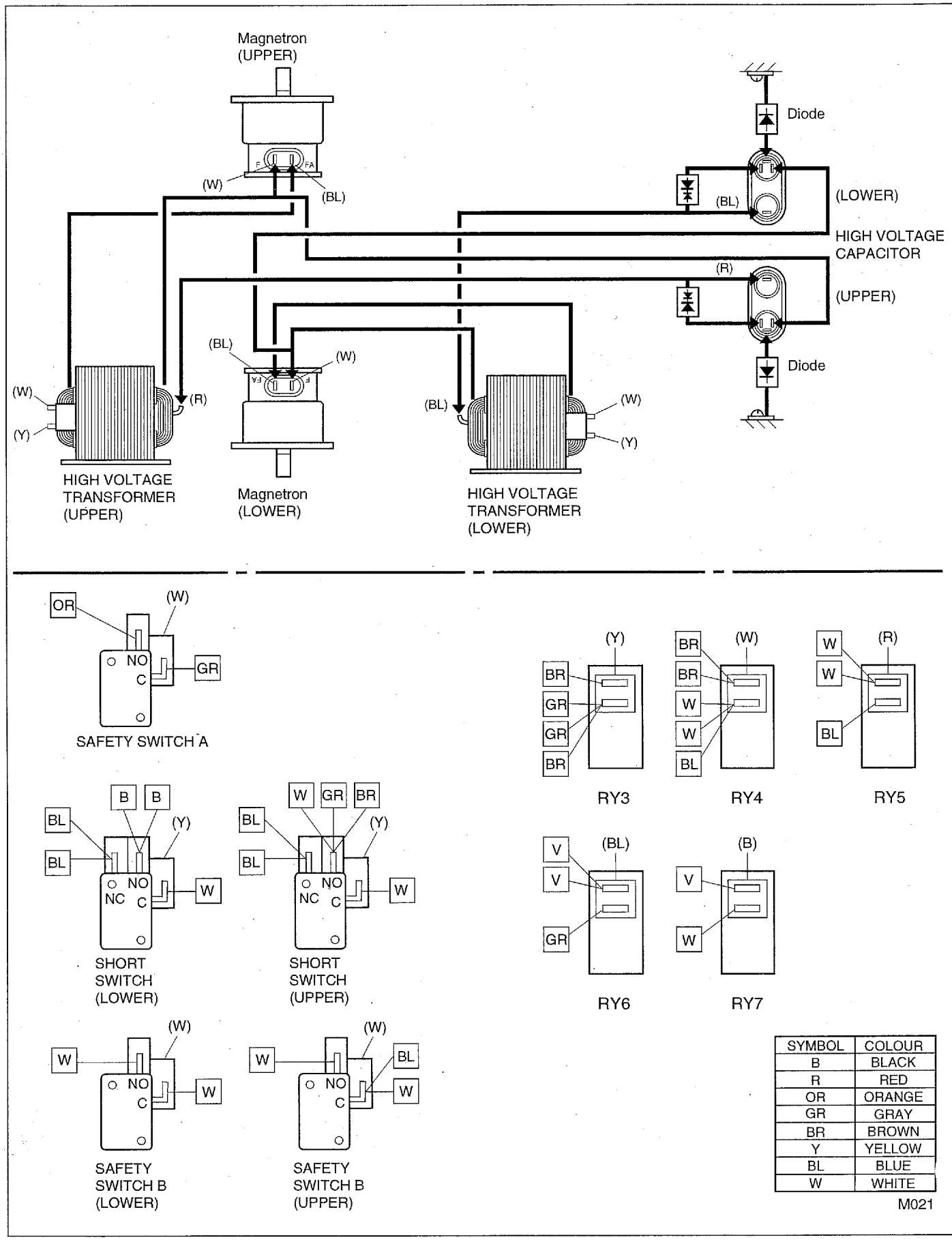
OPERATION	DISPLAY
1. Plug the power supply cord into wall receptacle. Do not open the door.	
2. Press and hold PROG pad until the display show "PROG", "P" and "L". (for more than 5 seconds)	PROG
3. Programme lock feature now activated.	PROG P L

SCHEMATIC DIAGRAM



WIRING DIAGRAM

NOTE: When replacing, check the lead wire colour as shown.



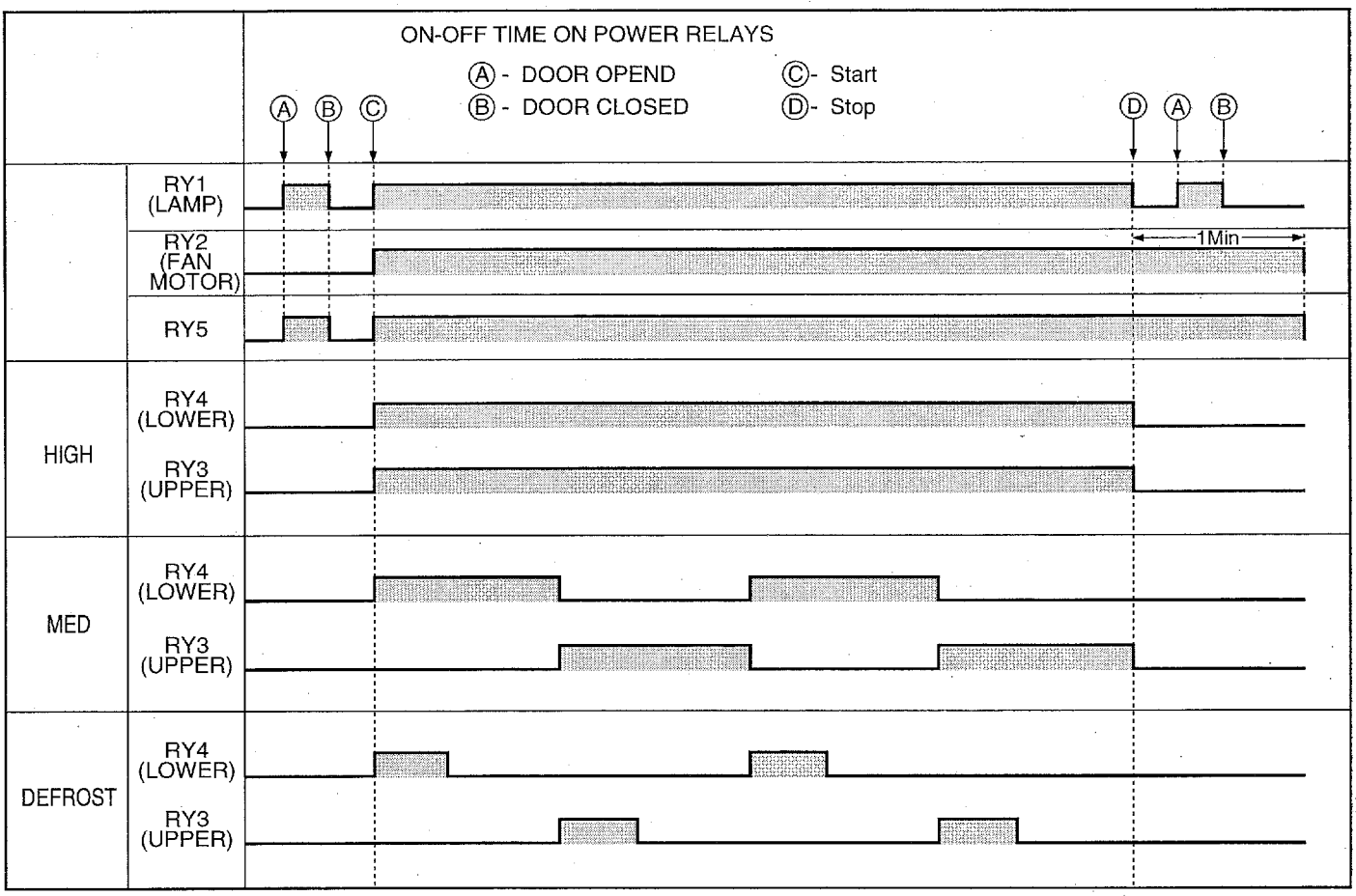
SYMBOL	COLOUR
B	BLACK
R	RED
OR	ORANGE
GR	GRAY
BR	BROWN
Y	YELLOW
BL	BLUE
W	WHITE

M021

DESCRIPTION OF OPERATING SEQUENCE

Variable power cooking control

The coil of power relay (RY3) and (RY4) are energized intermittently by the digital programmer circuit, when the oven is set to MEDIUM or DEFROST power position. The digital programmer circuit controls the ON-OFF time of the power relay (RY3) and (RY4) contacts in order to vary the output power of the microwave oven. One complete ON and OFF cycle of the power relay is 44 seconds. The relation between indications on the control panel and the output power of the microwave oven is as shown in **Figure**.



96-002M

CAUTIONS TO BE OBSERVED WHEN TROUBLESHOOTING

Unlike many other appliances, the microwave oven is high-voltage, high-current equipment. Though it is free from danger in ordinary use, extreme care should be taken during repair.

CAUTION

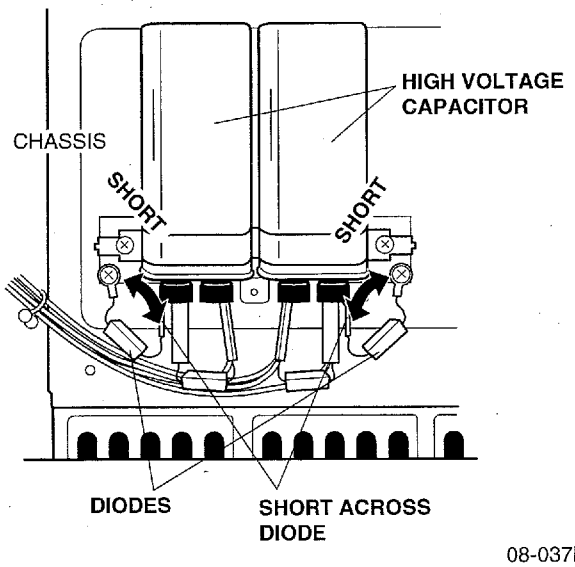
Servicemen should remove their watches whenever working close to or replacing the magnetron.

1. Check the grounding

Do not operate on a 2-wire extension cord. The microwave oven is designed to be used when grounded. It is imperative, therefore, to make sure it is grounded properly before beginning repair work.

2. Warning about the electric charge in the high voltage capacitor

For about 30 seconds after the oven is turned off, an electric charge remains in the high voltage capacitor.
When replacing or checking parts, remove the power plug from the outlet and short the terminal of the high voltage capacitor (terminal of lead wire from diode) to chassis ground with an insulated handle screwdriver to discharge.



08-037M

Discharge the 2 High Voltage Capacitors.
Touch chassis side first then short to the high voltage capacitor terminal.

WARNING

There is high-voltage present, with high-current capabilities in the circuits of the high voltage winding and filament winding of the high voltage transformer. It is extremely dangerous to work on or near these circuits with oven energized.
DO NOT measure the voltage in the high voltage circuit including filament voltage of magnetron.

WARNING

Never touch any circuit wiring with your hand nor with an insulated tool during operation.

3. When parts must be replaced, remove the power plug from the outlet.

4. When the 10A 250V fuse is blown due to the operation of short switch:

WARNING

When the 10A 250V. fuse is blown due to the operation of short switch, you must replace Primary latch switch and short switch. Also replace power relay (RY3 or RY4) when the continuity check reads shorted contacts (1-2).

(A) This is mandatory. Refer to"Adjustments and Measurements" for these switches.
(B) When replacing the fuse, confirm that it has the appropriate rating for these models.
(C) When replacing faulty switches, be sure mounting tabs are not bent, broken or otherwise deficient in their ability to hold the switches.

5. Avoid inserting nails, wire, etc. through any hole in the unit during operation.

Never insert a wire, nail or any other metal object through the lamp holes on the cavity or any other holes or gaps, because such objects may work as an antenna and cause microwave leakage.

6. Confirm after repair

(A) After repair or replacement of parts, make sure that the screws of the oven, etc. are neither loose nor missing.
Microwaves might leak if screws are not properly tightened.
(B) Make sure that all electrical connections are tight before inserting the plug into the wall outlet.

CAUTION
MICROWAVE RADIATION

DO NOT BECOME EXPOSED TO RADIATION FROM THE MICROWAVE GENERATOR OR OTHER PARTS CONDUCTING MICROWAVE ENERGY.

IMPORTANT NOTICE

1. The following components have potentials above 250V while the appliance is operated.
   - ※ Magnetron
   - ※ High voltage transformer
   - ※ High voltage diode
   - ※ High voltage capacitor
   - ※ Protector diode

   Pay special attention on these portions.
2. When the appliance is operated with the door hinge or magnetron fixed incorrectly, the microwave leakage can reach more than 5mW/cm^2. After repair or exchange, it is very important to check if magnetron and the door hinge is correctly fixed.

DISASSEMBLY AND PARTS REPLACEMENT PROCEDURE

CAUTION
Servicemen should remove their watches whenever working close to or replacing the magnetron.

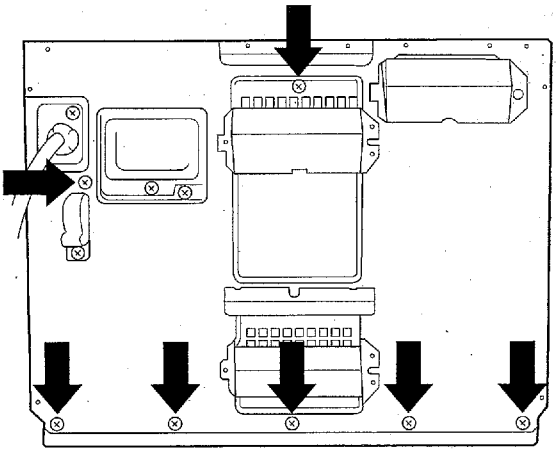
1. Replacement of magnetrons (Upper and Lower)

Upper magnetron
(A) Discharge electric charge remaining on the high voltage capacitors.
(B) Remove the entire rear panel by removing screws as shown.
(C) Disconnect all lead wires from magnetron and thermal cutout.
(D) Remove the 4 screws holding magnetron.
(E) Remove 2 screws holding thermal cutout.
(F) Remove the mounting bracket from magnetron and install it on the new magnetron.

Lower magnetron
(A) Discharge electric charge remaining on the high voltage capacitors.
(B) Remove the entire rear panel by removing screws as shown.
(C) Carefully place the unit on its left side (H.V.Capacitor side).
(D) Remove the cover by removing 2 screws.
(E) Remove the 4 screws holding magnetron by inserting screwdriver through the 4 openings on bottom plate.
(F) Remove 2 screws holding thermal cutout.
(G) Remove the mounting bracket from magnetron and install it on the new magnetron.

NOTE: To prevent microwave leakage, tighten mounting screws properly making sure there is no gap between the waveguide and the magnetron.

CAUTION
When connecting 2 filament lead wires to the magnetron terminals, be sure to connect the lead wires in the correct position. The lead wire with blue connector should be connected to "FA terminal" and white or pink one should be connected to "F terminal".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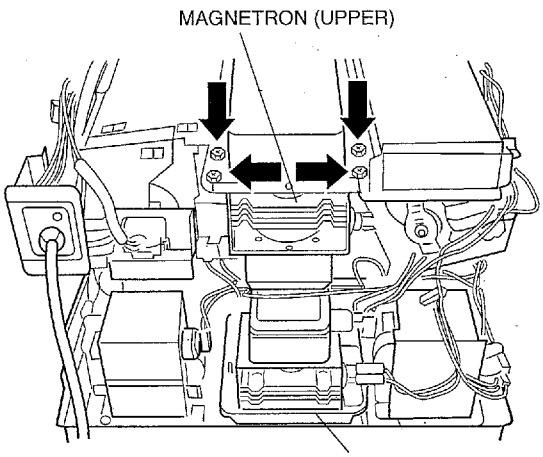

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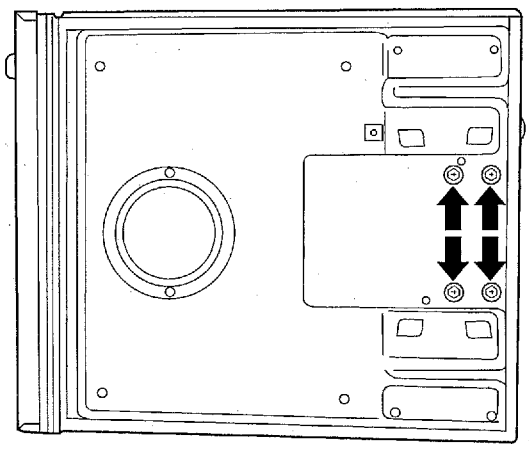
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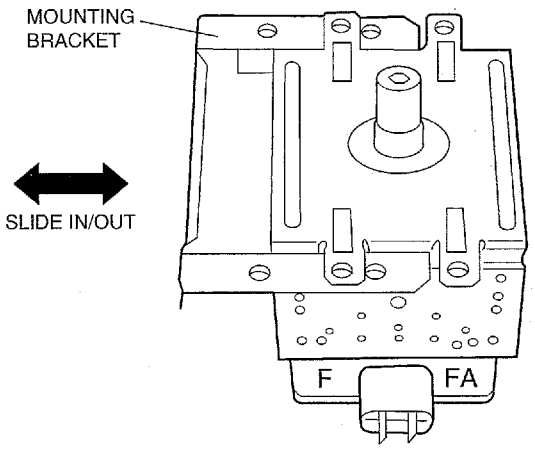


08-031M

Removal of Positive Lock connector
The positive lock connector is a specially designed loose free connector and you will find this connector in many lead wire connections. To remove this connector, pull the lead wire by pressing an extruded lever in the center of receptacle terminal as shown.

2. Replacement of power supply circuit board

NOTE: Be sure to ground any static electric charge built up on your body, before handling the power supply P.C.B., PC Board B and D.P.C..

(A) Disconnect all lead wires from power supply circuit board.
(B) Remove the power supply P.C.B. together with its mounting bracket by first removing the 2 bracket holding screws.
(C) The power supply P.C.B. can be separated from mounting bracket by removing the 2 L.V.T. holding screws and unfastening the plastic clips.

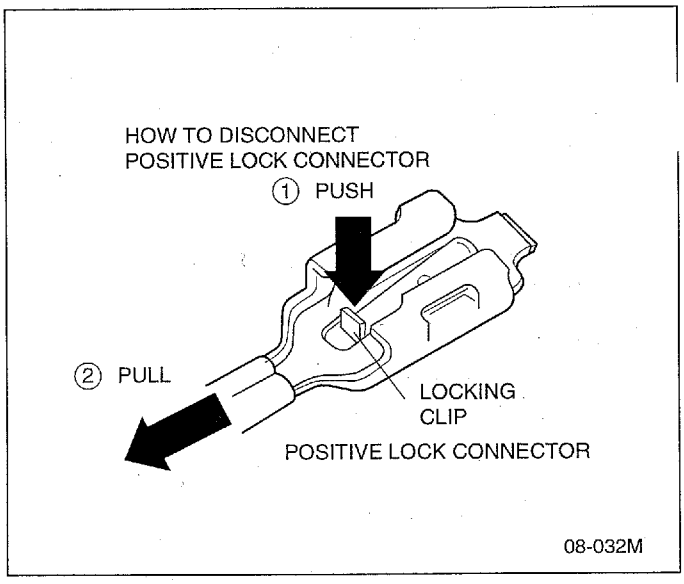
3. Replacement of PC Board B

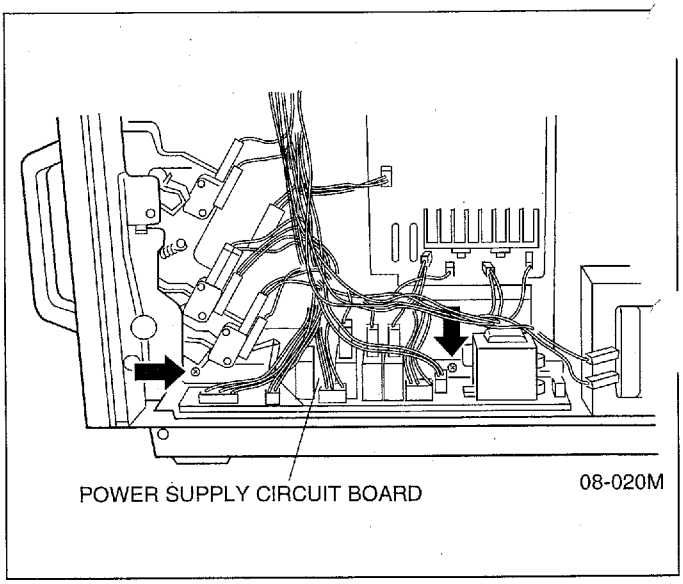
(A) Remove grounding screw for membrane switch and D.P.C. ground.
(B) Remove 3 screws holding control panel assembly to detach it from main unit then remove connectors.
(C) Remove 1 screw holding the PC Board B and while pushing back on 2 plastic holding clips, remove the board.

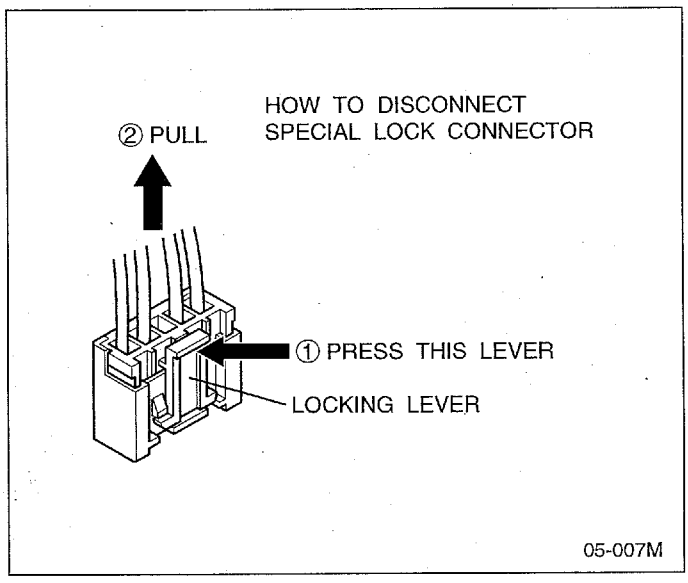
4. Replacement of digital programmer circuit

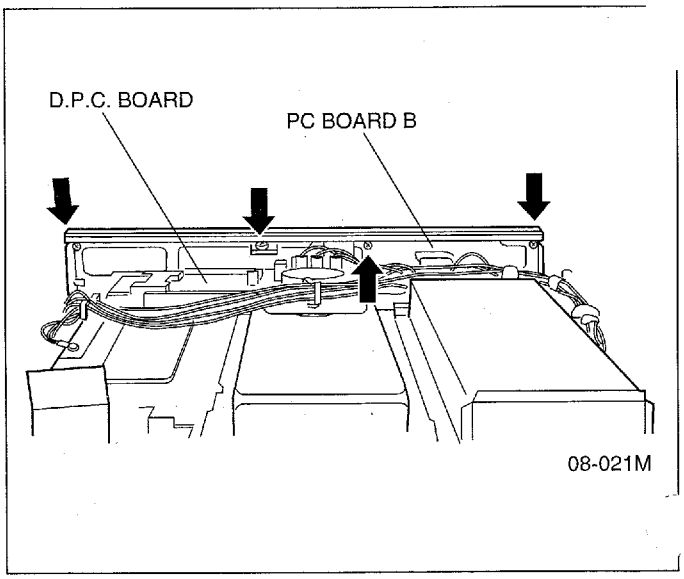
(A) Disconnect all connectors connected to the D.P.C. board.
(B) Remove 5 screws holding the D.P.C. board and detach it.

NOTE: Please use care in handling the power supply P.C.B., PC Board B and D.P.C. board to avoid damage.









5. Replacement of upper antenna

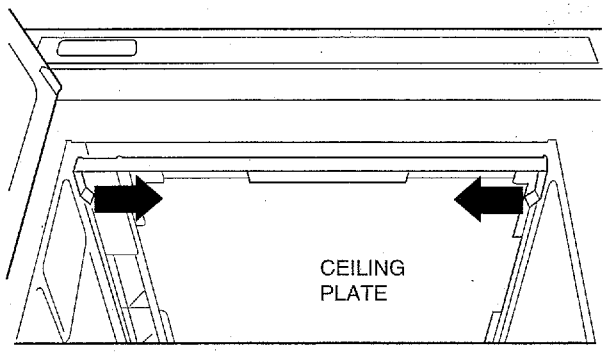
CAUTION

The upper and lower rotating antennas are different type and are not interchangeable each other. Care should be taken not to reverse the top and bottom antennas.

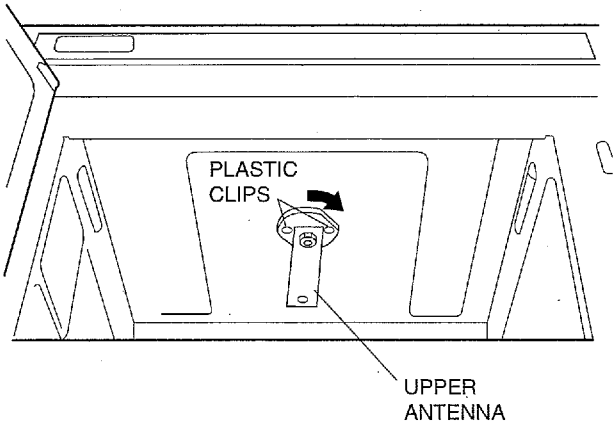
(A) Remove ceiling plate by gently moving the left and right tabs inward while pulling the plate down and outward.
(B) Using a small flat screwdriver or the like, remove two plastic clips located on the antenna ring. Next turn the antenna ring approx. 1/8 turn clockwise to unhook the tabs and pull off.

6. Replacement of floor shelf and lower antenna

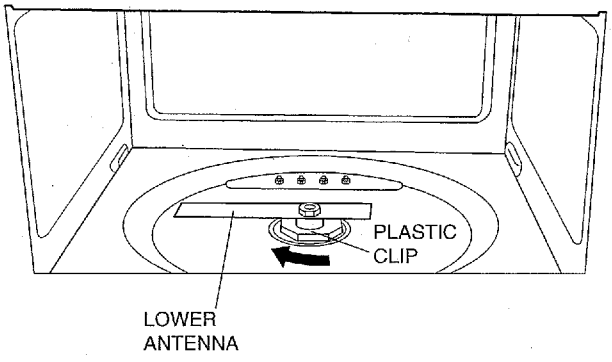
(A) To remove the floor shelf, insert a screwdriver through the small opening on the left side of the oven cavity and carefully lift the floor shelf.
(B) For removal of lower antenna, use the same procedure as upper antenna.



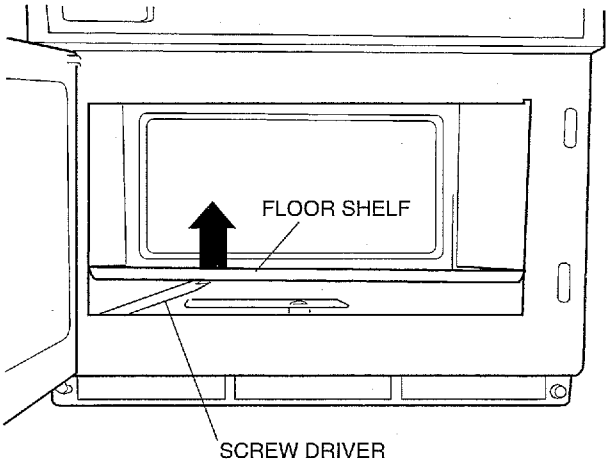
02-031M



02-032M



08-033M



02-033M

7. Replacement of temperature sensor (Thermal protector)

(A) Cut 2 lead wires at the top of sensor terminals.
(B) Remove 2 screws holding temp sensor and replace with new one.
(C) Solder the lead wires securely to the sensor terminals.

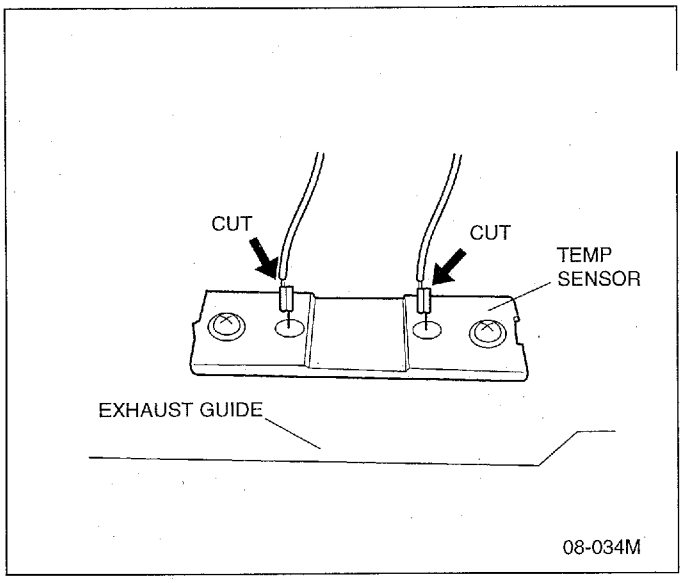
8. Disassembly of door assembly

(A) Remove each 2 bolts holding upper and lower hinges.
(B) Open the door and while pulling the door outward, work upper and lower hinges out through the holes of the front surface of oven.
(C) Remove door C (choke cover) from door E by carefully pulling outward starting from the upper right hand corner.
(D) Remove 2 screws holding door handle and separate door A from door E by carefully freeing catch hooks.
(E) Remove door key, door key lever, door key spring and handle pins from door E.
(F) Assemble the door by taking the above steps in a reverse order.

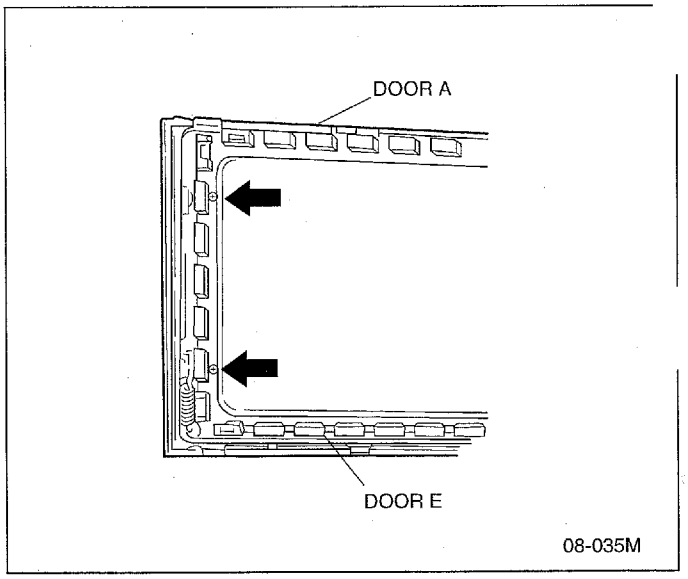
Replacement

(A) When mounting the door to the oven be sure to adjust the door parallel to the bottom line of the oven face plate by moving the upper and lower hinges in the direction necessary for proper alignment.
(B) Adjust so that the door has no play between the inner door surface and oven front surface. If the door assembly is not mounted properly, microwave may leak from the clearance between the door and the oven.

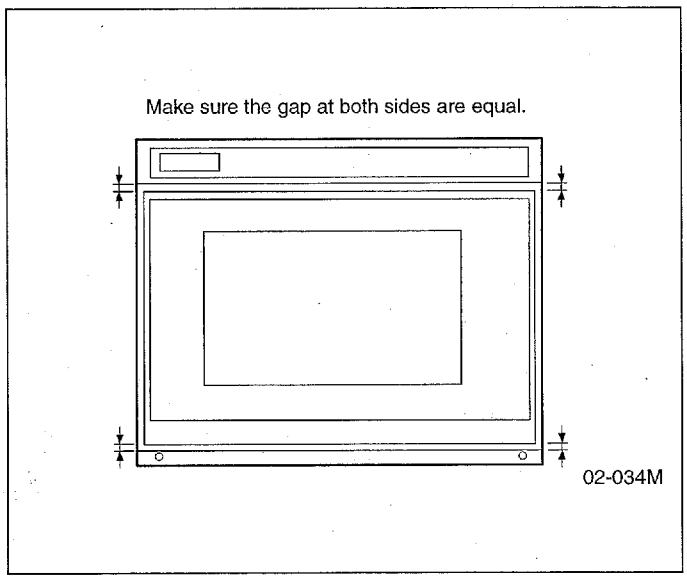
NOTE: Please refer to MEASURENMENTS AND ADJUSTMENTS.



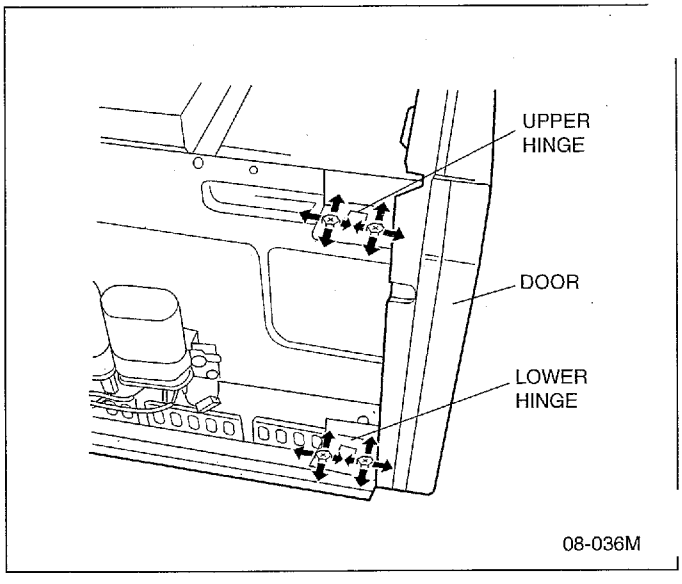
08-034M



08-035M



02-034M



08-036M

COMPONENT TEST PROCEDURE

CAUTION

1. High voltage is present at the high voltage terminal of the high voltage transformer during any cook cycle.
2. It is neither necessary nor advisable to attempt measurement of the high voltage.
3. Before touching any oven components, or wiring, always unplug the oven from its power source and discharge the high voltage capacitor.

1. High voltage transformer

(A) Remove connections from the transformer terminals and check continuity.
(B) Normal (cold) resistance readings should be as follows:

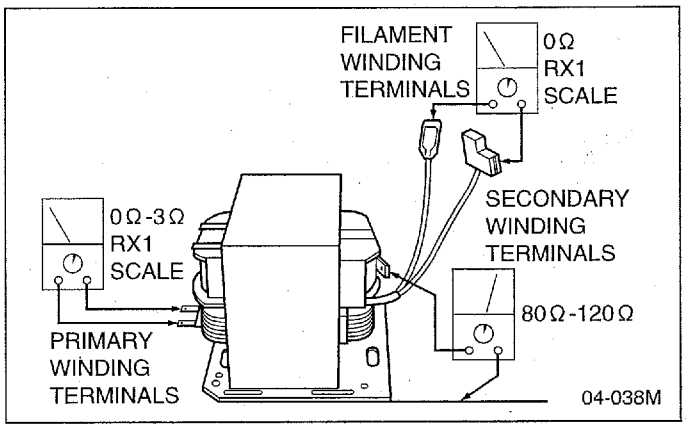
Secondary winding	Approx. 80 Ω ~ 120 Ω
Filament winding	Approx. 0 Ω
Primary winding	Approx. 0 Ω ~ 3 Ω

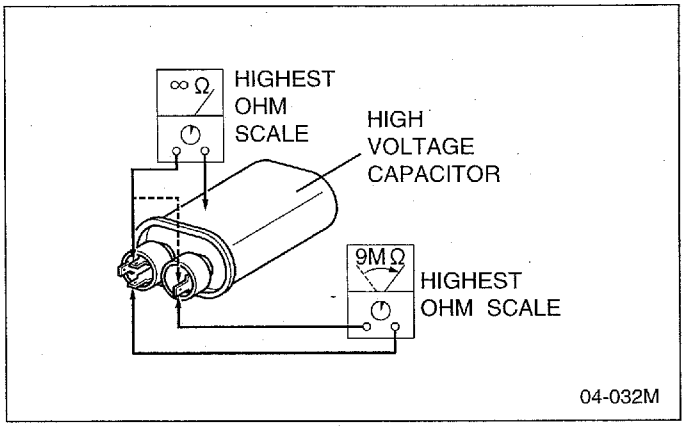
2. High voltage capacitor

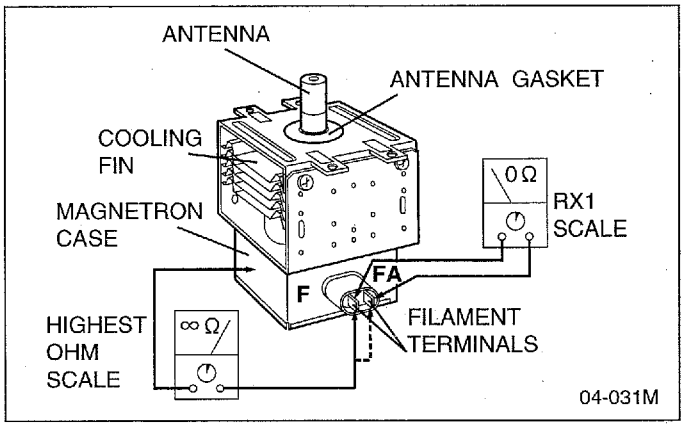
(A) Check continuity of capacitor with meter on highest OHM scale.
(B) A normal capacitor will show continuity for a short time, and then indicate 9MΩ once the capacitor is charged.
(C) A shorted capacitor will show continuous continuity.
(D) An open capacitor will show constant 9MΩ.
(E) Resistance between each terminal and chassis should be infinite.

3. Magnetron

Continuity checks can only indicate an open filament or a shorted magnetron. To diagnose for an open filament or shorted magnetron.
(A) Isolate magnetron from the circuit by disconnecting the leads.
(B) A continuity check across magnetron filament terminals should indicate one ohm or less.
(C) A continuity check between each filament terminal and magnetron case should read open.

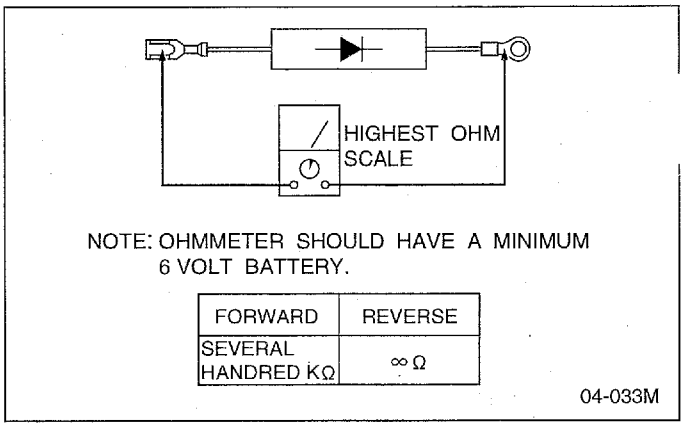






4. Diode

(A) Isolate the diode from the circuit by disconnecting the leads.
(B) With the ohmmeter set on the highest resistance scale, measure the resistance across the diode terminals. Reverse the meter leads and again observe the resistance reading. Meter with 6V, 9V or higher voltage batteries should be used to check the front-to-back resistance of the diode, otherwise an infinite resistance may be read in both directions.
A normal diode's resistance will be infinite in one direction and several hundred kΩ in the other direction.



NOTE: OHMMETER SHOULD HAVE A MINIMUM 6 VOLT BATTERY.

FORWARD	REVERSE
SEVERAL HANDRED KΩ	∞ Ω

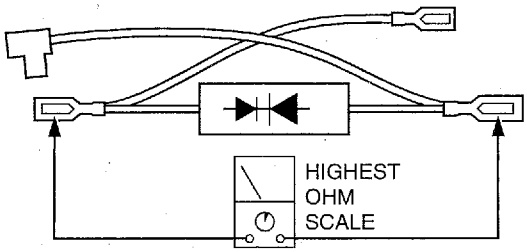
04-033M

5. Membrane key board (Membrane switch assembly)

Check continuity between switch terminals, by tapping an appropriate pad on the key board. The contacts assignment of the respective pads on the key board is as shown in digital programmer circuit.

6. Protector diode

(A) Isolate the protector diode assembly from the circuit by disconnecting its leads.
(B) With the ohmmeter set on the highest resistance scale, measure the resistance across the protector diode terminals.
Reverse the meter leads and again observe the resistance reading.
A normal protector diode's resistance will be infinite in both directions.
It is faulty if it shows continuity in one or both directions.



FORWARD	REVERSE
∞ Ω	∞ Ω

04-039M

7. Temp sensor (Thermal protector)

A temp sensor is mounted on exhaust guide. Its purpose is to automatically shut off the oven in case the cavity overheats for any reason.
The thermal protector will operate at 257°F (125°C).
The device is connected to the DPC on touch control models.
When the thermal protector exceeds its temperature it will turn off the power to oven cavity and display wil go to reset mode.
The cooking program can be reset after cool-down.
THERMISTOR RESISTANCE VALUE
30K-120K at 10°C-30°C (50°F-86°F)

MEASUREMENTS AND ADJUSTMENTS

1. Adjustment of safety switch A, safety switch B and short switch

(A) When mounting safety switch A, safety switch B and short switch to door hook assembly, mount each switch to the door hook assembly as shown in Figure right.

NOTE: No specific adjustment during installation of safety switch A, safety switch B and short switch to the door hook is necessary.

(B) When mounting the door hook assembly to the oven assembly, adjust the door hook assembly by moving it in the direction of arrow in table so that the oven door will not have any play in it. Check for play in the door by pulling the door assembly. Make sure that the latch keys move smoothly after adjustment is completed. Completely tighten the screws holding the door hook assembly to the oven assembly.

(C) Reconnect the short switch and check the continuity of the monitor circuit and all latch switches again by following the COMPONENT TEST PROCEDURE.

2. Measurement of microwave output

The output power of magnetron can be determined by performing IEC standard test procedures. However, due to the complexity of IEC test procedures, it is recommended to test the magnetron using the simple method outlined below.

Necessary Equipmet:

* 1 liter beaker * Glass thermometer
* Wrist watch or stopwatch

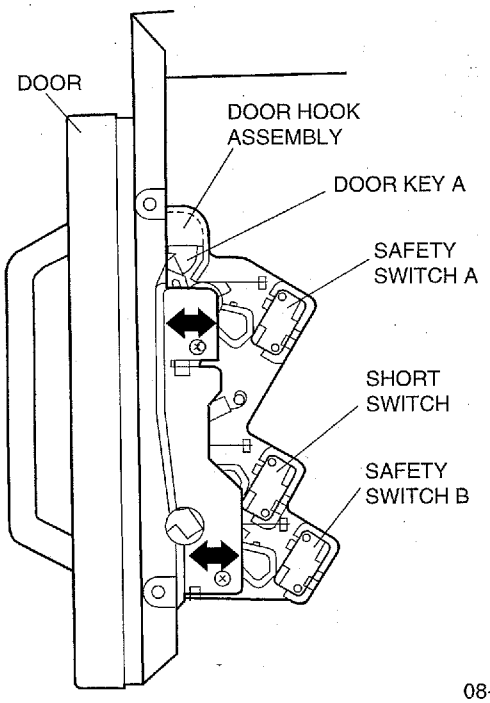
NOTE: Check the line voltage under load. Low voltage will lower the magnetron output. Take the temperature readings and heating time as accurate as possible.

(A) Fill the beaker with exactly one liter of tap water. Stir the water using the thermometer and record the beaker's temperature (recorded as T1).

(B) Place the beaker on the center of glass cook plate. Set the oven for High power and heat it for exactly one minute.

(C) Stir the water again and read the temperature of the beaker (recorded as T2).

(D) The normal temperature rise (T2-T1) at High power position for each model is as shown in table.



08-038M

Please confirm that the gap between the switch housing and switch actuator levers is no more than 1.0 mm when the door is closed.

TABLE (1 ℓ -1min. test)

RATED OUTPUT	TEMPERATURE RISE
1300W (IEC-705)	Min. 11.5°C
1400W (IEC-705)	Min. 12.5°C
1700W (IEC-705)	Min. 15.0°C
1800W (IEC-705)	Min. 16.0°C

TROUBLESHOOTING GUIDE

CAUTION

1. Check grounding before checking for trouble.
2. Be cafeful of the high voltage circuit.
3. Discharge high voltage capacitor.
4. When checking the continuity of the switches or the high voltage transformer, disconnect one lead wire from these parts and then check continuity with the AC plug removed. To do otherwise may result in a false reading or damage to your meter.
   When disconnecting a plastic connector from a terminal, you must hold the plastic connector instead of the lead wire and then disconnect it, otherwise lead wire may be open or the connector cannot be removed.
5. Be sure to ground any static electric charge built up in your body, before handling the D.P.C.
6. A 220-240V AC is present at the shaded area ▩ of the power supply circuit board (Terminals of power relays and primary circuit of low voltage transformer). When troubleshooting, be cautious of possible electrical shock hazard.

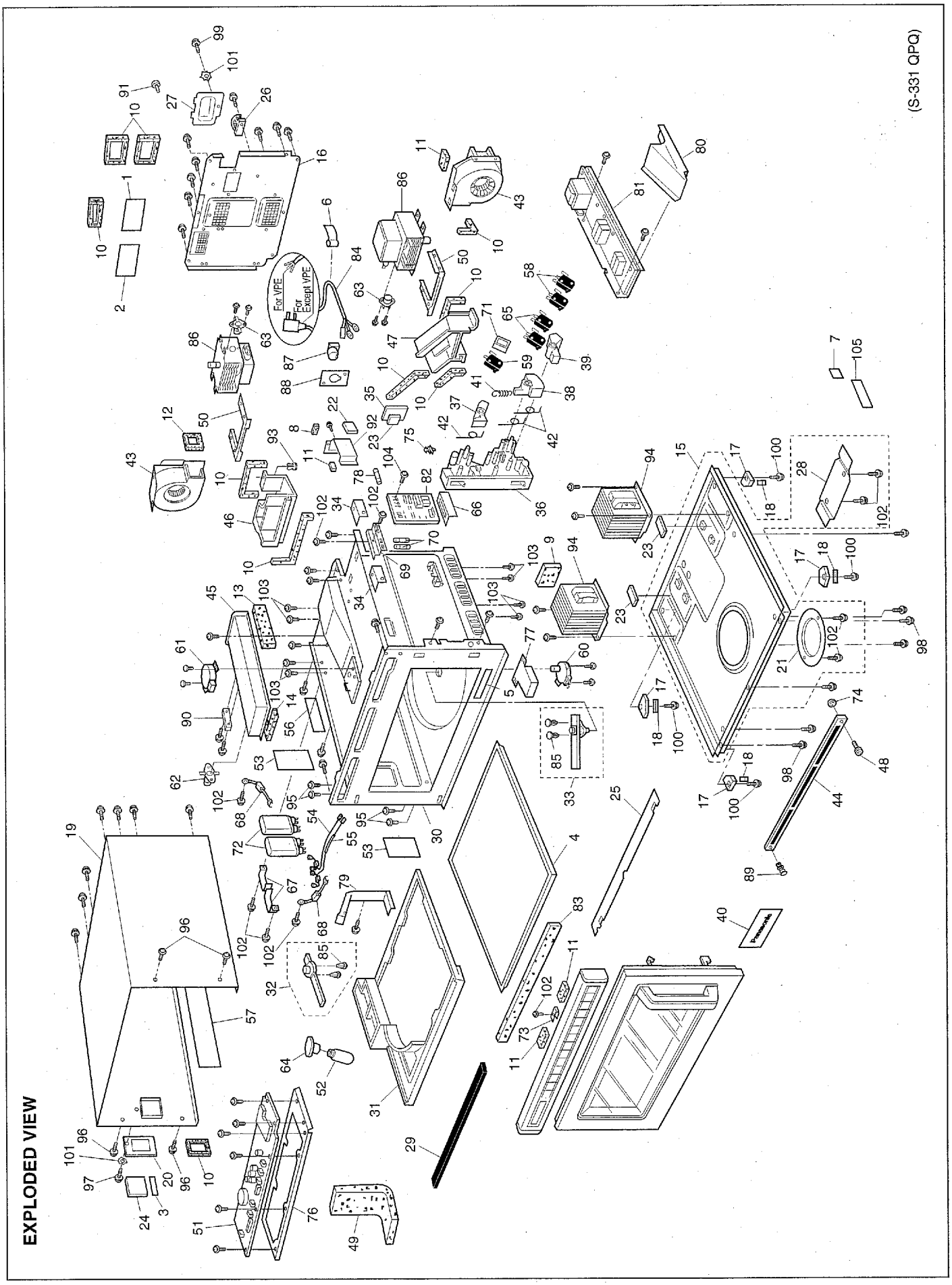
First of all operate the microwave oven following the correct operating procedures described on pages 4 ~ 8 of this service manual in order to find the exact cause of any trouble.

NOTE: If the unit shows faulty symptom as shown below, check the parts listed in possible cause column depending on failure indication e.g. F81, F82 in the display.

[TROUBLE 1] Oven does not operate at all or oven does not start cooking.

DISPLAY	CONDITIONS	POSSIBLE CAUSE	TIMING OF FAILURE INDICATION
F33	Open temperature sensor (exhaust)	1.Temperature sensor failure 2.Digital programmer circuit failure 3.Loose connector CN4	It is appeared when failure occured.
F34	Short temperature sensor (exhaust)	1.Temperature sensor failure 2.Digital programmer circuit failure	It is appeared when failure occured.
F44		1.Shorted membrane switch 2.Digital programmer circuit failure	It is appeared 2 minuted after failure occured.
F01 (With continuous beep sounds)	Exhaust temperature exceeds 120°C	1.Burning food in the oven due to over cooking	It is appeared when exhaust temperature exceeds above 120°C
F05	Memory failure	1.Digital programmer circuit failure	
No display	1.25A fuse blown	1.Switch failure SW4, SW5, SW6, SW7 2.Low voltage transformer failure	
No display	1.25A fuse is OK	1.Switch failure SW1, SW2, SW3 2.Low voltage transformer failure 3.Digital programmer circuit failure	
F81	No voltage supply to high voltage transformer (upper)	1.Relay failure RY-3 2.Switch failure SW4, SW5 3.10A fuse open 4.Digital programmer circuit failure	It is appeared when cooking is completed.
F82	No voltage supply to high voltage transformer (lower)	1.Relay failure RY-4 2.Switch failure SW6, SW7 3.10A fuse open 4.Digital programmer circuit failure	It is appeared when cooking is completed.
F86	Shorted contacts of RY-3 and RY-5	1.Relay failure RY-3 and RY-5 2.Digital programmer circuit failure	It is appeared when failure occured.
F87	Shorted contacts of RY-4 and RY-5	1.Relay failure RY-4 and RY-5 2.Digital programmer circuit failure	It is appeared when failure occured.

EXPLODED VIEW AND PARTS LIST



PARTS LIST

NOTE 1: When ordering replacement part(s), please use part number(s) shown in this parts list.
Do not use description of the part.

2: Important safety notice:
Components identified by ⚠ mark have special characteristics important for safety.
When replacing any of these components, use only manufacturer's specified parts.

3: Alphabet marks in Remarks colums (i.e. HNE etc) indicate parts applicable to only specified country models as follows.

HNE: For Hong Kong, VPE: For South Africa etc,
JPG: For New Zealand, MKQ: For Singapore,
MNQ: For Malaysia, QPQ: For Australia

Parts without these marks can be used for all models.

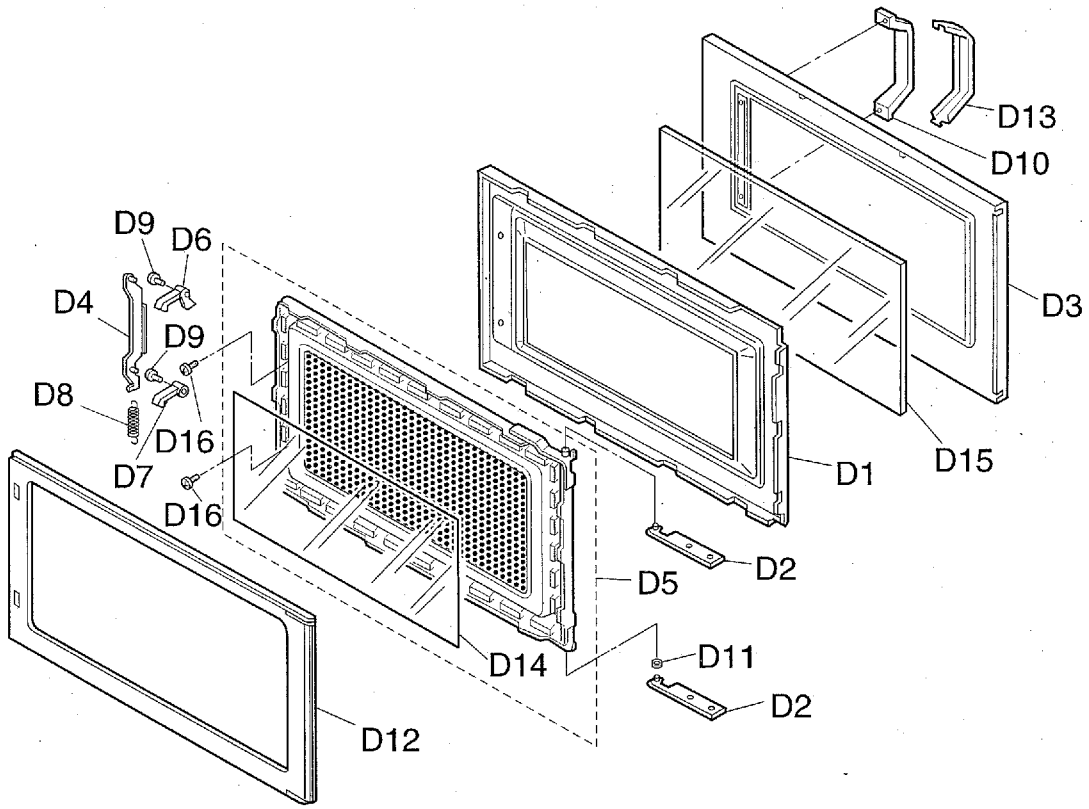
Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
1		A00065460JP	CAUTION LABEL	1	
2		A00065540MN	CAUTION LABEL	1	NE-1456 MKQ,NE-1856 MKQ
3		ANE0072Z70GP	CAUTION LABEL	1	
4		ANE010T8U0AP	SHELF	1	
5		A01726210JP	CAUTION LABEL	1	NE-1456 JPG,NE-1856 JPG
6		ANE0239570BN	CORD LABEL	1	NE-1356 HNE,NE-1456 MKQ/MNQ, NE-1756 HNE,NE-1856 MKQ/MNQ
6		ANE0239L00XN	CORD LABEL	1	NE-1356 VPE,NE-1756 VPE
7		A02840000MK	NUMBER LABEL	1	NE-1456 MKQ,NE-1856 MKQ
8		ANE0901000CD	CUSHION RUBBER A	1	
9		ANE0911000MG	CUSHION RUBBER B	1	
10		ANE000Z000AA	CUSHION RUBBER C	10	
11		ANE000Z000AD	CUSHION RUBBER C	4	
12		ANE000Z000AB	CUSHION RUBBER C	1	
13		ANE0962000AP	CUSHION RUBBER D	1	
14		ANE0962000AV	CUSHION RUBBER D	1	
15		A100A-3280	BASE	1	W/FOOT,RUBBER FOOT (NOTE 4)
16		A100Q-3280	BACK PANEL	1	
17		A1007-3280	FOOT	4	
18		A1008-3280	RUBBER FOOT	4	
19		ANE10098U0AP	CABINET BODY	1	
20		ANE10268U0AP	LAMP COVER	1	
21		ANE10288U0AP	ANTENNA MOTOR COVER	1	
22		ANE10498U0AP	CUSHION RUBBER	1	
23		ANE1062-8U0	CUSHION RUBBER B	3	
24		A10923310GP	INTERRUPTION COVER B	1	
25		ANE11268U0AP	BASE BRACKET	1	
26		ANE11408A0AG	STOPPER	1	
27		ANE11548U0AP	BACK PANEL COVER	1	
28		ANE11668U0AP	BASE METAL	1	
29		ANE11748U0AP	SPACER	1	
30	⚠	A200A-3280	OVEN	1	
31	⚠	A2011-3470	CEILING PLATE	1	
32		A202K-3280	ANTENNA (U)	1	UPPER
33		A202R3320GP	ANTENNA B (U)	1	LOWER
34		A6070-3280	INSULATION SHEET A	2	
35		ANE21208U0AP	SPACER	1	
36	⚠	A3020-3470	DOOR HOOK	1	
37		A3136-3470	HOOK SPACER A	1	
38		A3137-3470	HOOK SPACER B	1	
39		A3138-3470	HOOK SPACER C	1	
40		A31863310HN	DOOR PANEL	1	NE-1356 HNE
40		A31863310VP	DOOR PANEL	1	NE-1356 VPE
40		A31863310BP	DOOR PANEL	1	NE-1456 JPG/QPQ
40		A31863310MN	DOOR PANEL	1	NE-1456 MKQ/MNQ
40		A31863330HN	DOOR PANEL	1	NE-1756 HNE

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
40		A31863330VP	DOOR PANEL	1	NE-1756 VPE
40		A31863330GP	DOOR PANEL	1	NE-1856 JPG/QPQ
40		A31863330MN	DOOR PANEL	1	NE-1856 MKQ/MNQ
41		ANE32398U0AP	SPRING	1	
42		ANE32628U0AP	SPRING	3	
43		A400A3310GP	FAN MOTOR	2	55W
44		A400B-3280	AIR FILTER FLAME	1	
45		A400K-3180	EXHAUST GUIDE	1	
46		ANE40258U0AP	AIR GUIDE A	1	UPPER
47		ANE40268U0AP	AIR GUIDE B	1	LOWER
48		A4091-3280	SCREW	1	FOR AIR FILTER FLAME
49		ANE41038U0AP	AIR GUIDE CUSHION B	1	
50		ANE50328U0AP	MAGNETRON BRACKET	2	
51		A603L3310GP	D.P.CIRCUIT (U)	1	RTL (W/COMPONENT)
52		ANE6030Q50GN	INCANDESCENT LAMP	1	240V/25W
53		ANE60408U0AP	OVEN LAMP SHEET	2	
54		A606V-3280	PROTECTOR DIODE	1	CONNECTOR COLOR:RED
55		A606W-3280	PROTECTOR DIODE B	1	CONNECTOR COLOR:BLUE
56		ANE60708U0BP	INSULATION SHEET A	1	
57		A6071-3280	INSULATION SHEET B	1	
58	⚠	ANE6142-F60	MICROSWITCH	2	(V-15G-3C26) SECONDARY LATCH SWITCH
59	⚠	ANE61424L0AG	MICROSWITCH	1	(V-16G-3C26) PRIMARY LATCH SWITCH
60		A6144-3280	ANTENNA MOTOR	1	(2.5W) LOWER
61		A61446030AP	ANTENNA MOTOR	1	(2.5W) UPPER
62	⚠	A61454000AP	THERMAL CUTOUT	1	FOR OVEN
63	⚠	A61454210AP	THERMAL CUTOUT	2	FOR MAGNETRON
64	⚠	ANE61522Q0BP	SOCKET	1	
65		ANE6161-3X0	MICRO SWITCH	2	(V-16-1C25) SHORT SWITCH
66		A6170-3280	INSULATION SHEET C	1	
67		ANE61888U0AP	CAPACITOR BRACKET	2	
68	⚠	A62024000AP	DIODE,SI	2	
69		ANE62298U0AP	MOUNTING BRACKET	1	
70	⚠	A62304210BP	FUSE	2	10A
71		ANE6238X20AP	SPACER	1	
72	⚠	A63903310GP	H.V.CAPACITOR	2	NE-1356,NE-1456 AC2300V,0.82MF
72	⚠	A63903330GP	H.V.CAPACITOR	2	NE-1756,NE-1856 AC2300V,1MF
73		ANE64086Q0AP	WASHER	1	
74		A6408-3280	WASHER	1	FOR AIR FILTER FRAME
75		ANE65448U0AP	SPACER A	1	
76		A6585-3280	P.C.B.HOLDER	1	
77		A65943030GP	MOTOR COVER	1	
78	⚠	A65953170GP	FUSE	1	1.25A
79		ANE66038U0BP	OVEN LAMP BRACKET	1	
80		A6688-3180	COVER	1	
81		A692M3310HN	L.V.TRANSFORMER (U)	1	NE-1356,NE-1756
81		A692M3310GP	L.V.TRANSFORMER (U)	1	NE-1456,NE-1856
82		A692Y3310GP	NOISE FILTER (U)	1	
83		A8251-3180	SPACER	1	
84	⚠	A900C3310HN	AC CORD W/PLUG	1	NE-1356 HNE,NE-1456 MKQ/MNQ, NE-1756 HNE,NE-1856 MKQ/MNQ (220-240V)
84	⚠	A900C3310QP	AC CORD W/PLUG	1	NE-1456 JPG/QPQ,NE-1856 JPG/QPQ (230-240V)
84	⚠	A90243310VP	AC CORD W/OUT PLUG	1	NE-1356 VPE,NE-1756 VPE (220V)
85		ANE900T8V0AP	CLIP	4	FOR ANTENNA (U),ANTENNA B (U)
86	⚠	2M210-M1ECOM	MAGNETRON	2	
87		ANE9027510RN	CORD BUSHING	1	
88		A90353060GP	CORD BRACKET	1	
89		ANE90828U0AP	CLIP (BLACK)	1	FOR AIR FILTER FLAME
90		A601L5150AP	TEMP SENSOR	1	
91		ANE91438U0AP	CLIP (GLAY)	1	FOR BACK PANEL COVER

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
92		ANE91448U0AP	BRACKET	1	
93		ANE91628U0AP	CLIP B	1	FOR AIR GUIDE A
94	⚠	J600B3310GP	H.V.TRANSFORMER	2	1.5KVA
95		XSWANE5+10U	SCREW	4	(5X10) FOR HINGE
96		XTC4+10BC	SCREW	4	4X10 (FOR CABINET BODY)
97		XTC4+10FC	SCREW	1	4X10 (FOR LAMP COVER)
98		XTC4+12BK	SCREW (BLACK)	2	4X12 (FOR BASE)
99		XTT4+8E	SCREW	1	4X8 (FOR BACK PANEL COVER)
100		XTWANE3+8EX	SCREW	4	3X8 (FOR FOOT)
101		XWC4BPN	WASHER	2	FOR BACK PANEL COVER, LAMP COVER
102		XYD4+EE12F	SCREW	11	4X12 (FOR DIODE,CAPACITOR BRACKET, SPACER,MOUNTING BRACKET,EARTH, ANTENNA MOTOR COVER,BASE METAL)
103		XYEANE5+C16T	SCREW	8	(5X16) FOR MAGNETRON
104		XYN4DF10BN	SCREW	1	4X10 (FOR NOISE FILTER)
105		A00073310HN	NAME PLATE	1	NE-1356 HNE
105		A00073310VP	NAME PLATE	1	NE-1356 VPE
105		A00073310JP	NAME PLATE	1	NE-1456 JPG
105		A00073310MK	NAME PLATE	1	NE-1456 MKQ
105		A00073310MN	NAME PLATE	1	NE-1456 MNQ
105		A00073310QP	NAME PLATE	1	NE-1456 QPQ
105		A00073330HN	NAME PLATE	1	NE-1756 HNE
105		A00073330VP	NAME PLATE	1	NE-1756 VPE
105		A00073330JP	NAME PLATE	1	NE-1856 JPG
105		A00073330MK	NAME PLATE	1	NE-1856 MKQ
105		A00073330MN	NAME PLATE	1	NE-1856 MNQ
105		A00073330QP	NAME PLATE	1	NE-1856 QPQ

NOTE 4 : Please order name plate together.

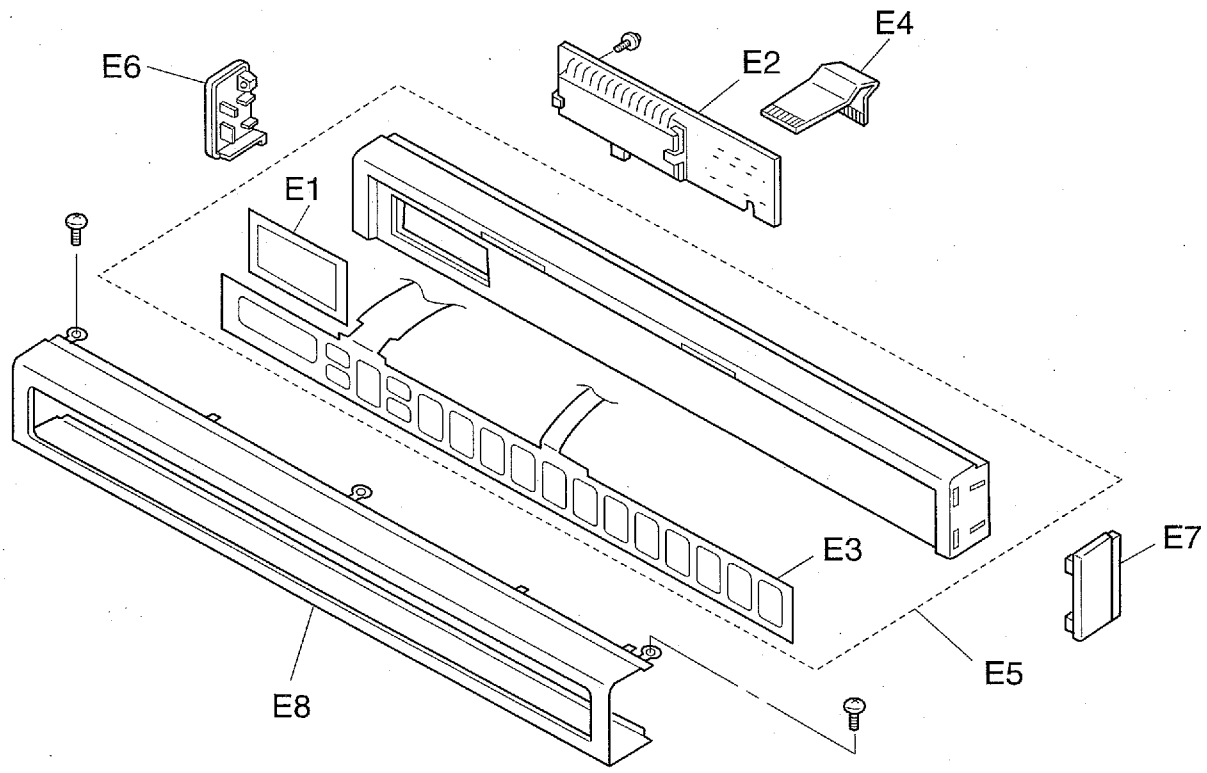
DOOR ASSEMBLY



(S-331 QPQ)

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
D1		ANE30038U0AP	DOOR FRAME (U)	1	
D2	⚠	ANE30078U0AP	HINGE	2	
D3	⚠	ANE301A8U0AP	DOOR A	1	
D4		ANE301H8U0AP	DOOR KEY LEVER B	1	
D5	⚠	ANE301Q8U0AP	DOOR E (U)	1	
D6		ANE30188U0AP	DOOR KEY	1	
D7		ANE30198U0AP	DOOR KEY B	1	
D8		ANE30218U0AP	DOOR KEY SPRING	1	
D9		ANE30562Q0AP	HANDLE PIN	2	
D10		A30703170GP	HANDLE PEICE A	1	
D11		ANE3081P60AP	DOOR HINGE SPACER	1	
D12	⚠	ANE30858U0AP	DOOR C	1	
D13		ANE31348U0AP	HANDLE PEICE B	1	
D14	⚠	ANE31458U0AP	DOOR SCREEN A	1	
D15		ANE31468U0AP	DOOR SCREEN B	1	
D16		XYEANE4+C16T	SCREW	2	4X16

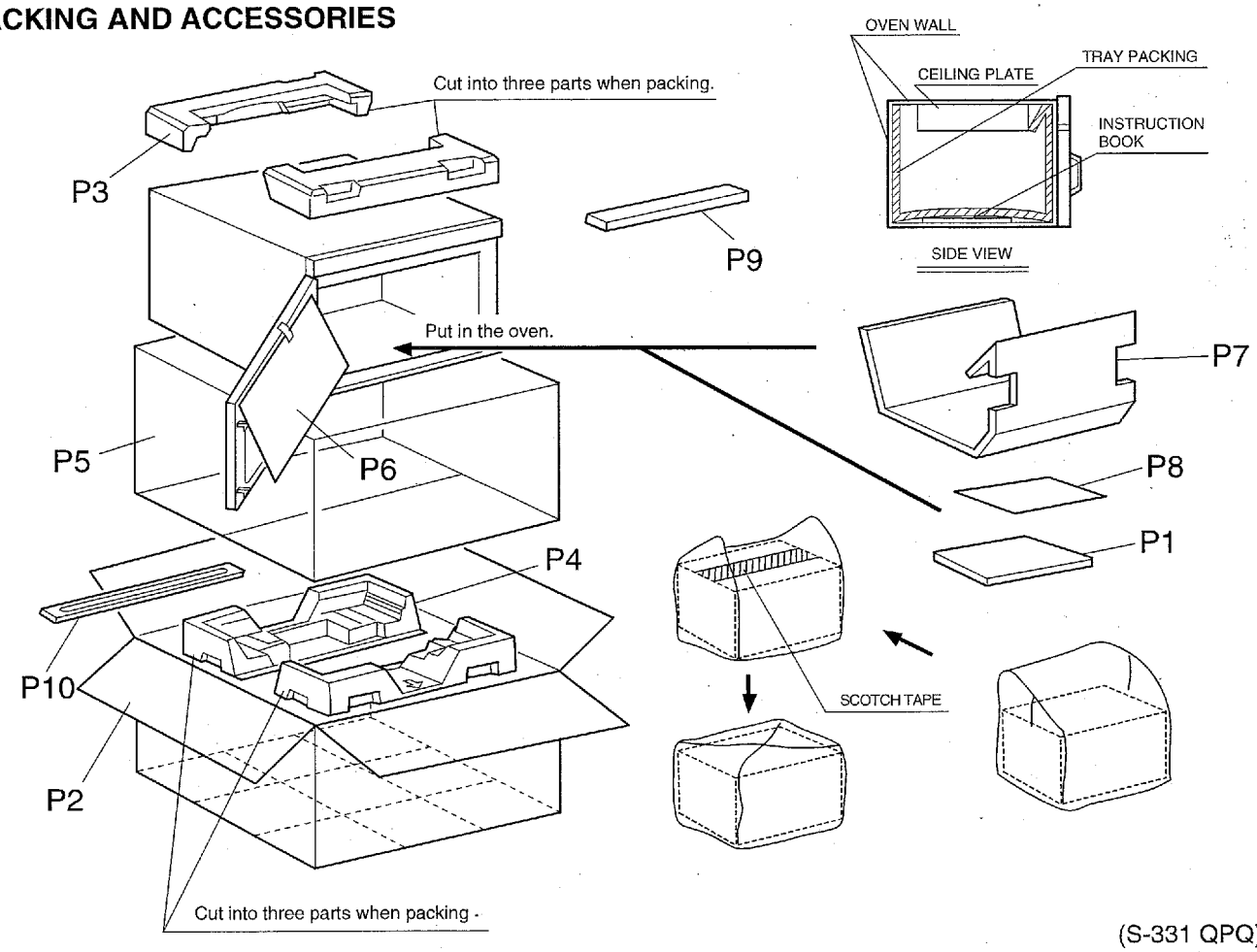
ESCUTCHEON BASE ASSEMBLY



(S-331 QPQ)

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
E1		A8337-3280	ESCUTCHEON SHEET	1	
E2		A603M3310GP	PC BOARD B (U)	1	
E3		A64793310QP	MEMBRANE SWITCH	1	
E4		A6590-3280	FLAT CABLE	1	
E5		ANE801N8U0AP	ESCUTCHEON A (U)	1	
E6		ANE80028U0AP	ESCUTCHEON B	1	
E7		ANE80068U0AP	ESCUTCHEON D	1	
E8		ANE80348U0AP	ESCUTCHEON BASE	1	

PACKING AND ACCESSORIES



(S-331 QPQ)

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
P1		A00033310HN	INSTRUCTION BOOK	1	NE-1356 HNE,NE-1456 MKQ/MNQ, NE-1756 HNE,NE-1856 MKQ/MNQ
P1		A00033310QP	INSTRUCTION BOOK	1	NE-1356 VPE,NE-1456 JPG/QPQ, NE-1756 VPE,NE-1856 JPG/QPQ
P2		A01023310HN	PACKING CASE,PAPER	1	NE-1356 HNE
P2		A01023310VP	PACKING CASE,PAPER	1	NE-1356 VPE
P2		A01023310JP	PACKING CASE,PAPER	1	NE-1456 JPG
P2		A01023310MK	PACKING CASE,PAPER	1	NE-1456 MKQ
P2		A01023310MN	PACKING CASE,PAPER	1	NE-1456 MNQ
P2		A01023310QP	PACKING CASE,PAPER	1	NE-1456 QPQ
P2		A01023330HN	PACKING CASE,PAPER	1	NE-1756 HNE
P2		A01023330VP	PACKING CASE,PAPER	1	NE-1756 VPE
P2		A01023330JP	PACKING CASE,PAPER	1	NE-1856 JPG
P2		A01023330MK	PACKING CASE,PAPER	1	NE-1856 MKQ
P2		A01023330MN	PACKING CASE,PAPER	1	NE-1856 MNQ
P2		A01023330QP	PACKING CASE,PAPER	1	NE-1856 QPQ
P3		ANE01048U0AP	UPPER FILLER	1	
P4		ANE01058U0AP	LOWER FILLER	1	
P5		A01065200AP	VINYL COVER	1	
P6		ANE01072Q0AP	DOOR SHEET	1	
P7		A01083310GP	TRAY PACKING	1	
P8		A04203310HN	OPERATING GUIDE	1	NE-1356 HNE,NE-1456 MKQ/MNQ, NE-1756 HNE,NE-1856 MKQ/MNQ
P8		A04203310QP	OPERATING GUIDE	1	NE-1356 VPE,NE-1456 JPG/QPQ, NE-1756 VPE,NE-1856 JPG/QPQ
P9		A01453230BP	DOOR SHEET B	1	
P10		A1134-3280	FOOT BRACKET	1	

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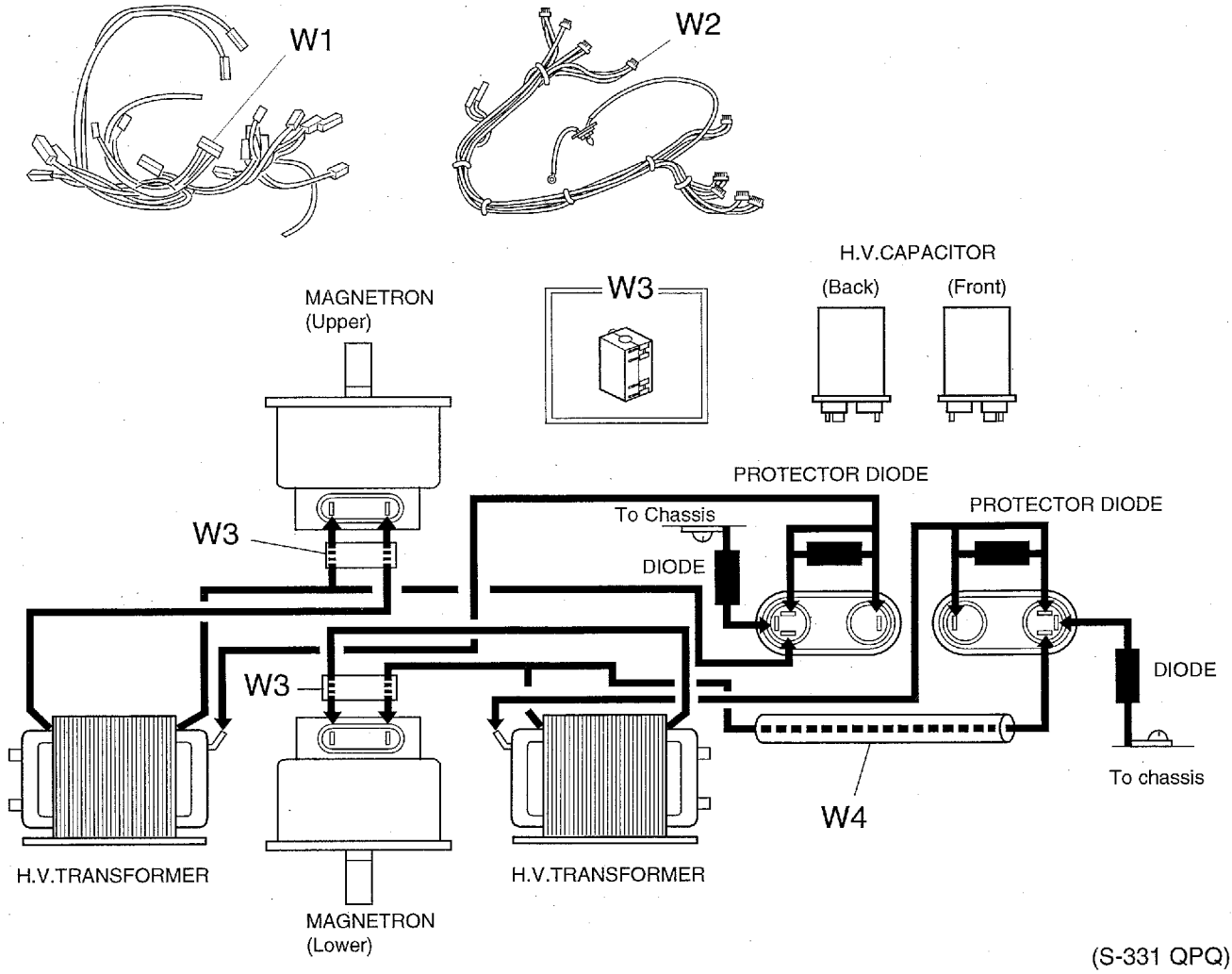
WIRING MATERIAL



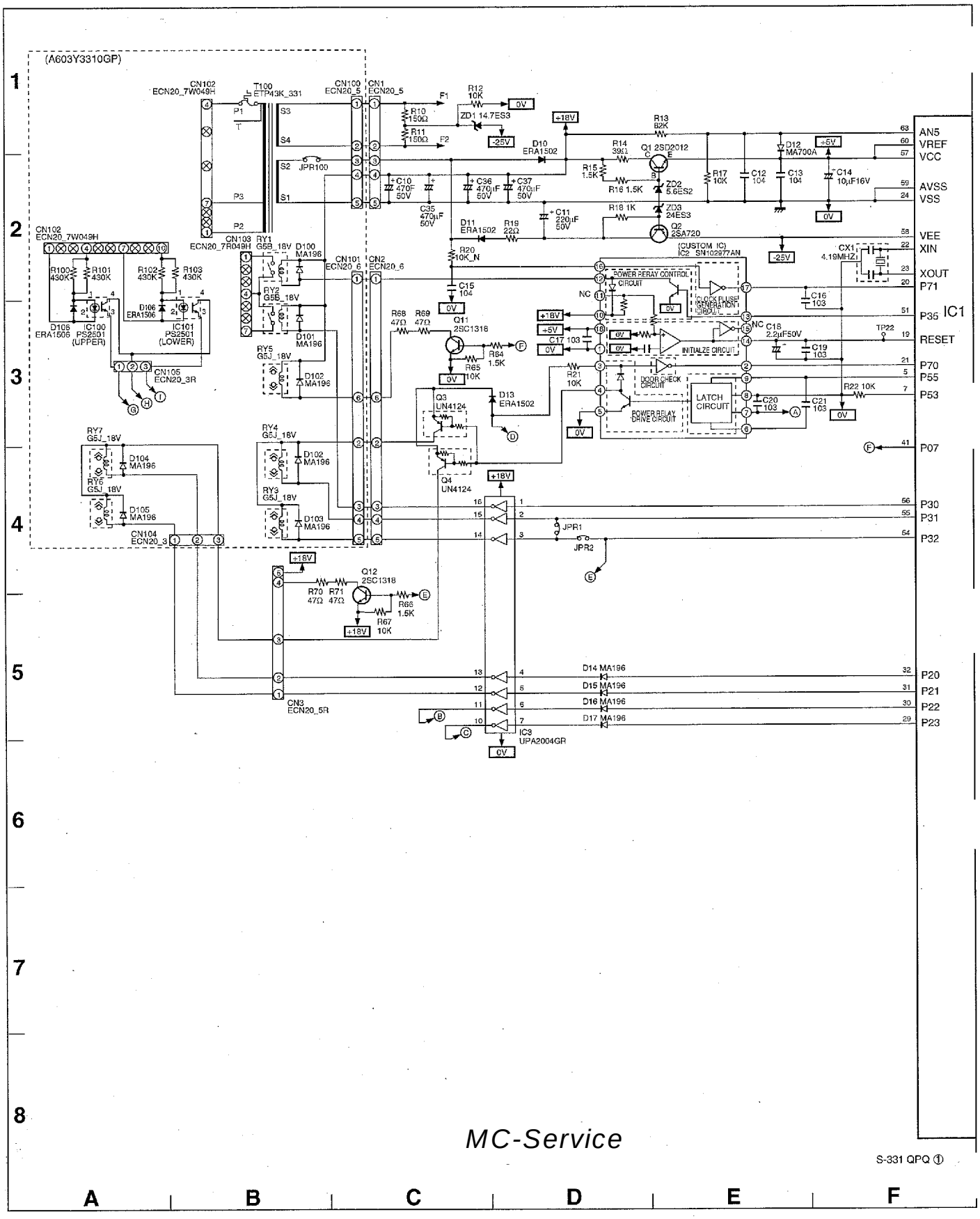
(S-331 QPQ)

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
W1		A030A3310GP	LEAD WIRE HARNESS	1	
W2		A030H3310GP	LEAD WIRE HARNESS B	1	
W3		A50966520UP	FERRITE CORE	2	
W4		A61393230BP	INSULATION TUBE	1	

Ref. No.		Part No.	Part Name & Description	Pcs/ Set	Remarks
REF NO. 81 L. V. TRANSFORMER (U)					
		ANE61158U0AP	POWER RELAY BRACKET	1	
		ANE65448U0AP	SPACER A	6	
		ANE65458U0AP	SPACER B	2	
		A6338-3280	INSULATION SHEET B	1	
		XYN3+F25S	SCREW	2	3X25
CN100		AEEMMF01F05W	CONNECTOR	1	5PIN
CN101		AEEMMF03F06W	CONNECTOR	1	6PIN
CN102		AEEMMD04907W	CONNECTOR	1	7PIN
CN103		AEEMMD04907R	CONNECTOR	1	7PIN
CN104		AEEMMF00703W	CONNECTOR	1	3PIN
CN105		AEEMMF00703R	CONNECTOR	1	3PIN
CN106		AEEMMD24910W	CONNECTOR	1	10PIN
D100,101, 102,103, 104,105, 108		MA196-(TA5)	DIODE,SI	7	
D106,107		AEDNERA1506	DIODE,SI	2	
IC100,101		AEICP25011HL	IC	2	
R100,101, 102,103		ERDS1TJ434T	CARBON FILM RESISTOR	4	430KΩ,1/2W,±5%
RY1	⚠	AEBG5B18P-1	POWER RELAY	1	18V(G5B-1-ER18)
RY2	⚠	AEBG5B1E18	POWER RELAY	1	18V(G5B-1-E)
RY3,4,5	⚠	AEG5J1EM18B	POWER RELAY	5	18V(G5J-1-TP-M-ER18)
T100		ETP43KJN61RN	L.V.TRANSFORMER	1	NE-1356,NE-1756
T100		ETP43KZN61CN	L.V.TRANSFORMER	1	NE-1456,NE-1856
REF NO. 82 NOISE FILTER (U)					
C1		ECQE2A474MWA	POLYESTER CAPACITOR	1	0.47MF,250V,±20%
C2,3		ANE6169A20GN	CAPACITOR	2	0.022MF,250V,±20%
CN10		AEEMMD00703W	CONNECTOR	1	3PIN
D1		ERZC10DK621F	VARISTOR	1	
D2,3		ERZC10DK112R	VARISTOR	2	
F1,2		A62316010BP	FUSE HOLDER	4	
F3		A62316000GP	FUSE HOLDER	2	
L1		A621A3310GP	FILTER COIL	1	
R1		ERF15ZXJ240	RESISTOR	1	24Ω,15W,±5%
REF NO. E2 P. C. BOARD B (U)					
		ANE82848U0AP	SPACER CUSHION	1	
CN250		AEEMHLEM21S	CONNECTOR	1	21PIN
DISP250		A64563080AP	FLUORESCENT TUBE	1	

DIGITAL PROGRAMMER CIRCUIT

SCHEMATIC DIAGRAM



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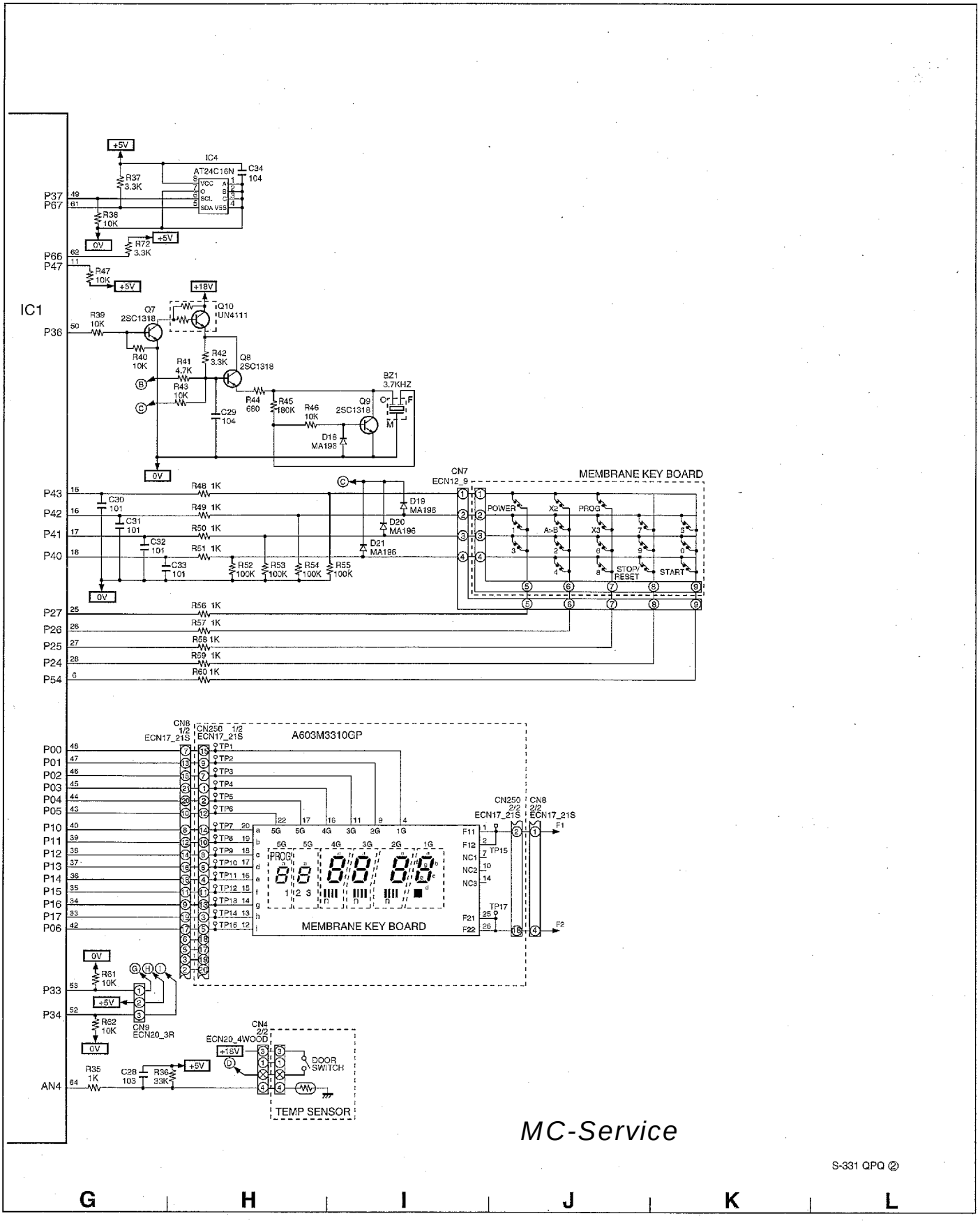

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DIGITAL PROGRAMMER CIRCUIT

PARTS LIST

Ref. No.	Part No.	Description	Pcs/ Set	Remarks
BZ1	EFBRL37C20	BUZZER	1	3.7KHZ
C10,35,36,37	ECA1HM471B	ELECTOROLYTIC CAPACITOR,AL	4	470MF/50V
C11	ECA1HM221B	ELECTROLYTIC CAPACITOR,AL	1	220MF/50V
C12,13,15, 22,25,27,28, 29,34	AECF50F104Z	CERAMIC CAPACITOR	9	0.1MF/50V
C14	ECEA1CKA100B	ELECTROLYTIC CAPACITOR,AL	1	10MF/16V
C16,17,19, 20,21	ECBT1E103ZF5	CERAMIC CAPACITOR	5	0.01MF/25V
C18	ECEA1HKA2R2B	ELECTROLYTIC CAPACITOR,AL	1	2.2MF/50V
C23,24,26, 30,31,32,33	ECBT1H101KB5	CERAMIC CAPACITOR	7	0.0001MF/50V
CN1	AEEMMF01F05W	CONNECTOR	1	5PIN
CN2	AEEMMF03F06W	CONNECTOR	1	6PIN
CN3	AEEMMF01F05R	CONNECTOR	1	5PIN-RED
CN4	AEEMMF00D04W	CONNECTOR	1	4PIN
CN7	AEEMMD1FF09W	CONNECTOR	1	9PIN
CN8	AEEMHLEM21S	CONNECTOR	1	
CN9	AEEMMF00703R	CONNECTOR	1	3PIN-RED
CX1	EFOGC4194T4	RESONATOR	1	4.19MHZ
D10,11,13	AEDNERA1502	DIODE,SI	3	1.0A
D12	MA700A-(TA)	DIODE,SI	1	0.03A
D14,15,16, 17,18,19,20, 21	MA196-(TA5)	DIODE,SI	8	0.1A
IC1	AEIC38122256	L.S.I	1	
IC2	AEIC102977AN	IC	1	AN6752
IC3	AEICU2004GR	IC	1	
IC4	AEICAT24C16N	IC	1	
Q1	AEGHPH0124BS	POWER RELAY	1	
Q1	2SD2012	TRANSISTOR,SI,2W	1	3MHZ
Q2,5	2SA720PRTA	TRANSISTOR,SI,400mW	2	200MHZ
Q3,4	UN4124-(TA)	TRANSISTOR,SI,300mW	2	
Q6,7,8,9,11, 12	2SC1318QSTA	TRANSISTOR,SI,400mW	6	200MHZ
Q10	UN4111-(TA)	TRANSISTOR,SI,300mW	1	
R10,11	ERDS2TJ151T	CARBON FILM RESISTOR	2	150Ω,1/4W,5%
R12,17,21, 22,23,25,27, 34,38,39,40, 46,47,61,62, 63,65,67	ERDS2TJ103T	CARBON FILM RESISTOR	18	10KΩ,1/4W,5%
R13	ERDS2TJ823T	CARBON FILM RESISTOR	1	82KΩ,1/4W,5%
R14	ERDS2TJ390T	CARBON FILM RESISTOR	1	39Ω,1/4W,5%
R15,16,32, 64,66	ERDS2TJ152T	CARBON FILM RESISTOR	5	1.5KΩ,1/4W,5%
R18,24,26, 28,29,30,31, 35,43,48,49, 50,51,56,57, 58,59,60	ERDS2TJ102T	CARBON FILM RESISTOR	18	1.0KΩ,1/4W,5%
R19	ERDS2TJ220T	CARBON FILM RESISTOR	1	22Ω,1/4W,5%
R20	ERDS2FJ103T	CARBON FILM RESISTOR	1	10KΩ,1/4W,5%
R33,44	ERDS2TJ681T	CARBON FILM RESISTOR	2	680Ω,1/4W,5%
R36	ERDS2TJ333T	CARBON FILM RESISTOR	1	33KΩ,1/4W 5%
R37,42,72	ERDS2TJ332T	CARBON FILM RESISTOR	3	3.3KΩ,1/4W,5%
R41	ERDS2TJ472T	CARBON FILM RESISTOR	1	4.7KΩ,1/4W,5%
R45	ERDS2TJ184T	CARBON FILM RESISTOR	1	180KΩ,1/4W 5%
R52,53,54,55	ERDS2TJ104T	CARBON FILM RESISTOR	4	100KΩ,1/4W,5%
R68,69,70,71	ERDS2TJ470T	CARBON FILM RESISTOR	4	47Ω,1/4W,5%
ZD1	AEDZ4R7ES3T1	ZENER DIODE,SI	1	
ZD2	AEDZ5R6ES2T1	ZENER DIODE,SI	1	
ZD3	AEDZ24ES3T1	ZENER DIODE,SI	1	

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